

By *John Mather*
Mather Bys

THE
PLUS ULTRA

reduced to a
NON PLUS:

OR,

A SPECIMEN of some *Animadversions* upon the
PLUS ULTRA of M^r. *Glanvill*, wherein sundry
Errors of some *VIRTUOSI* are discovered, the Credit of the *Aristotelians* in part *Re-advanced*; and Enquiries made about

The Advantages of the *Ancient Education* in England above the *Novel and Mechanical*.

The old *Peripatetick* notion of the *Gravity of the Air*, and the *Pressure of the æreal Columne or Cylinder*.

The *Deceitfulness of Telescopes*.

The *World in the Moon*, and a *Voyage thither*.

The *Original and Progress of Chymistry*.

The *Use of chymical Medicaments*.

The *Usefulness of the Peripatetick Philosophy* in reference to the *Practice of Physick*.

The *Original and Progress of Anatomy*.

The *First Inventor of the Circulation of the Blood*.

The *Transfusion of Blood*, the first *Proposers and Inventors thereof*; and its *Usefulness*.

The different *Nature of the Blood*, and the variety of *Phænomena* appearing upon the *burning thereof*, and *mixing of it with several liquors*.

Some *Trials* in order to a discovery of the *Nature of the English Baths*.

By *Henry Stubbe*, Physician at *Warwick*;

Isocrates in Encomio Helena,

Πάντ δὲ κατὰ τὴν ἐξέτασιν τοῦ καὶ ἡμεῖς καὶ οἱ ἄλλοι ἐκείνῃ καὶ τῇ ἀρχῇ ἀποδοῦναι δέοιται.
ὅτι μὲν οὖν καὶ ἐν ταῖς μυθολογίαις ἡ Πηνελόπειος ἐν ταῖς μαρτυρίαις καὶ τοῖς μύθοις καὶ τῇ βίᾳ αὐτῆς
φανερὰ.

A PREMONITION to the Ingenious and Considerate READER.

Above a year ago, at the Table of a Person of Honour, there hapned a Debate concerning the Utility of the Ancient and Established Method and Medicaments used in Physick, and How much the knowledge of the Doctrine of Elements, Elementary Qualities and Humors, (as vulgarly delivered) might contribute to the skill and successful Practice of a judicious Physician? There hapned to be present a Gentleman, very much concerned for the Promoting of Science, and a professed Admirer of the Institution of the Royal Society, who (as is usual with that sort of Virtuosi) instantly usurped all the Discourse, and avowed that All the Ancient Methods of Science were vain and useless to a Physician, and did not so much as contribute to the Cure of a Cut-finger. With this rash and hasty Censure I confess I was surpris'd, and demanding what knowledge he had in the received Methods of Physick and Medicaments? I found him altogether ignorant therein, but some crude Assertions of the new Philosophers, and some imperfect Experiments were alledged in behalf of Universal Inference, and no less then Stupidity charged upon the precedent Philosophers and Physicians, with those that adhered unto them: In fine, He avowed that this opinion of his was the

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positive and dogmatical averment even to a syllable, of Mr. Glanvill and other *Virtuosi*, and that it was undeniably evinced in a Book of theirs about **The Modern Improvements of Useful Knowledge**. After a brief reply to this Insolent, shewing that the ancient Philosophy had not been so steril in reference to Physick, but that it had been the foundation of all those accounts of the Causes, Prognosticks, and Cures of Diseases (as also of the Healing of Cut-fingers and green wounds) by which of old and in latter times Patients had been benefited: that the nature of infirmities had been explicated, and the qualities and use of Medicaments successfully explained upon those grounds: and whatever Defects there were in those received Principles, No Physician, that understood what he said, could deny them to be exceeding useful; that for any man to speak otherwise, was to expose himself to just scorn and contempt. As also for any man to go about to invidiate and discredit the present authentic Methods of Curing upon no other exceptions then those, that the Philosophy whereupon those Theorems were raised was false and frivolous, was an Intolerable Impertinence; since that even in Mathematicks it was notorious, that many solid Truths had been happily deduced from false suppositions and Postulata; that in Common Logick Right Conclusions might be the result of ridiculous Premiss's; and the Rule of falshood in Arithmetick would alone serve to convince any man, that upon imaginary, yea, confessedly

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sedly false Hypotheses, important and true deductions might be judiciously continued. After that an end was put to this contest by a more general conversation, I still retained a sense of the Injury I supposed to be done to me and all Rational Physicians, by this barbarous Opiniatur; I determined to avenge my Faculty upon Mr. Glanvill for this, and by sacrificing that Virtuoso to publick Obloquy, thereby to establish (if possible) our general repose and tranquillitie, that we might not (as I observed we were) be troubled in all Companies and Assemblies, with Extravagancies of this kinde; there appearing unto me daily a greater necessitie of securing our Eares with black wooll or Wax, against the Buzz and Noise of these Prattle-boxes, then ever Ulysses had upon his approach to the Sirens: Our ruine being as certain from them; and there being nothing of Harmony in such Discourses, nothing but discord and jarring, in comparison whereof the screeching of Owls, the creaking of doors, and whatever noise else is offensive, seemed Musical and Melodious. Upon the perusal of Mr. Glanvill's Book (which He had recommended unto me) I met with so much of Ignorance, that I wondered how several men should concur to mistake so, and I thought it a difficult matter to reply, it being too tedious for one of so little leisure as I have, to inform persons that were conceited and knew nothing.

How,

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Howsoever, for the general benefit of the Age, I purposed to write *some Animadversions* upon him, and ther. by to put a stop to the pride of such Ignoramus's, and amongst the several antiquated Philosophies which our Times have renewed, to introduce amongst the Virtu si that of Pythagoras, the first rudiments whereof consist d in this, that **the Disciples were obliged for five years to hold their peace.** Upon the reading of Mr. Glarvill, I saw my self under a necessitie of examining the *History of the Royal Society*, the tendencie whereof I observed to be so pernicious, that, if the first provocation had made me **angry**, I was now become **obstinate**. In that *Famed Work* I encountred with so many **illiterate passages**, that the credit of **our Nation** seemed concerned in the refuting it. I met with *Passages* so *destructive* that, if to be concerned for the interest of the present Monarchy, the Protestant Religion, and the emolument of each private person (and not solely of *Tradesmen*) could warrant any one for putting Pen to paper, I ought not to be silent. I divided my *Animadversions* into several parts; some whereof were to represent these *Comical Wits* as really ridiculous; others were to make them odious to the Kingdom. I considered, that in these days few had patience to read over prolix Treatises; as also I imagined, that the Contest would be more deeply imprinted in the minds of men, if they were excited by a variety of discourse of that nature. The first Specimen of *Animadversion* upon Dr. Sprat and Mr. Glarvill were dispatched last Easter;

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Easter; but the *Comical Wits* were so alarmed at what they at first *despised*, that they employed all their *Artifices* to divert me: and if *malicious threats* or other *disingenuous proceedings* could have wrought upon me, the thing had died: But those *pitiful Mechanic* understood not the weakness of such Batteries upon me, and in all my life (which those *mean spirits* pretended *they would write*) I am sure there was never any circumstance could induce them to conjecture that I was to be discouraged by *Menaces*; Besides, having found them so *ungenerous*, I concluded it more *unsafe* to *desist*, then to *proceed*: I knew the *cruelty* of *Commands*, and that who had to do with *wolves*, must not make himself a *Sheep*: I evidently saw *designes* not only upon my *Fortunes*, but *Life*; I know the *pernicious Memory* of *mean and proud spirits*, the *Obligation* would be lost in *spying them*; whilst the *Ignominy* was so great, to be at my *Mercy*: I concluded that the most *daring Council* was the *best*; that it was no *disparagement* for me to be overthrown by *power*, and that I should multiply *shame* upon them, when it should be said, I fell their *Victour* and their *Martyr*. Although I had submitted those papers to the most *severe Judgment* of a *Cautious Person* (giving him *absolute liberty* to disprove whatsoever he thought *harsh*, or *culpable*) resolving never to look upon or alter them after he had viewed them; when they were authorised to the *Press*, and that there was no longer doubt of their *Imocency*, they containing nothing repugnant to the *Government*, *Church of England*,

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or Good Manners, yet did some of the *Virtuosi* (notwithstanding that they pretended to be desirous it should come out, and that rather than the Book should meet with any obstacle their President should licence it) procure the Impression to be stopped: If this be Generous, if this be agreeable to that frankness of mind and Philosophy which you profess; Ores-haute, and tres-agreeable Comediants, I appeal to all English and brave spirits! Could any man have perswaded the world, before this Essay, that you who seem the sole Dictators of Wit, and useful Knowledge, would have employed your power against me! And that thirty Legions were to be called to aid You against a young Countrey-Physician, who had so long discontinued Studies of this nature, and had so little time to resume them; or recollect his thoughts! Pardon me, if I tell you, there is nothing Noble in this demeanour, and whatever there may be of the *Virtuoso*, there is no Gallantry of Vertue will give countenance to it, nor any thing that derives from the Tutor of Alexander. Go, procure an Act of Parliament, or sollicite for a Proclamation, that none write or speak against you; by such means ensure those Triumphs over the ancient Education of this Kingdom, the two Universities, and the Protestant Church; which the Sprats and Glandvills by their Goose-quills cannot achieve for you. To this course I should willingly submit, and not envy you such accessions of Glory: And as a Supplement to the Lives of your Worthies, only write them impartially;

TO the READER.

I give you leave to *forgive* what you will concerning *Me*. Take not the advantage against these *Animadversions*, which the *Printers* mistakes occasioned: they are many, and since you were in part a cause of them, by *distracting* and *impeding* of the *publication*; and I being *absent* could not *remedy* them, 'twill be ignoble to press upon *confessed errors*, some whereof are reduced into a *Catalogue*. As to the *incoherences* of some places, and the *incongruities* of the *English*, I acknowledge there are *sundry* of that kind; but do not think my self accountable for those *failures*, nor for those *repetitions* of things, which as I travelled came into my *memory*; some whereof had been sent to *London* before. Howsoever, if you can *refute* the *substance* of the *Discourses*, I shall leave it to your *prudence*, after this *declaration*, how you will manage the *controversie*. When the other piece against *Dr. Sprat* will come out, is a matter I cannot well promise to the world: The *Virtuosi* can best undertake for that. I have respited the *publication* hereof thus long, to try, if any *Letters* of mine, or *Entreaties* might prevail with them: I joyned also *Menaces* that I would *post* them; which *indignities* I wonder men of *Tolerable Ingenuitie*, or of so great *arrogance* would *out-live*. And the *Theological Censure* being already *publick*, I found the expectation of all men *impatient* to see some of these *Animadversions*.

There

To the READER.

See *Camp-*
panella of the
Spanish Mo-
narchy, in
English, s. 10.
p. 47. c. 25. p.
157. c. 27. p.
177. 18. 181.
182. 183.

There is another Treatise, shewing the *Original* of the *Colledge of Experimental Philosophers*, as *Campanella* projected it, and containing a *parallel* of what *He* contrived (and their *Historian* hath pursued) for the reducing of *England* and *Holland* to *Popery*: also a *Specimen* of sundry *Experiments* published by several *Virtuosi*, that are *false* or *false*, yet boasted of as *their proper Inventions*: together with Instances of the *danger* that all *Tradesmen* will run into by the continuance of *this Assembly*; which to manifest further, I shall here adde a *Proposal* designed to have been tendred, and improved into an *Act*, in this last Session of *Parliament*. It was delivered by Sir P.N. to an *Honourable Member* of the *House of Commons*, and by *Him* sent unto me, adding, "In which you may see what *they* *have* at, "viz. Instead of *Monopolizing* this or that "particular Trade at a time, once for all to "have a *Monopoly* for all that ever should be "invented.

"It is proposed, that such kinde of pre-
"tended new *Inventions* relating to *Mecha-*
"nicks, *Trades*, or *Manufactures*, as are or
"shall be offered to the *Parliament*, may by
"them be referred to such indifferent judi-
"cious persons, as are like to give them a faith-
"ful Account, about the *Newness*, *Reality*,
Use-

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“Usefulness, &c. of the things proposed,
“and whether they are like to answer the ef-
“fects pretended to, and to make Report of
“the same to the Parliament.

“And the Royal Society of London for
“Improving of Natural Knowledge, being
“already fixed into a Corporation, and the
“Council of the said Society consisting of 11,
“being by their Constitution under an
“Oath, to deal faithfully in all things be-
“longing to the Trust committed to the said
“Council: It is offered, that such things may
“be preferred to the said Council, and they
“to Report unto the Parliament.

They that know the Men, know their meaning: and
whosoever understand the Constitution of our Par-
liaments, is assured that they need not look out of
their own number for indifferent judicious persons, to in-
form the House what the Reality, Usefulness, or New-
ness, &c. is of Inventions; or should the Parliament
be at any time destitute of such Intelligence, the Coun-
cil must make better Reports than doth their Histo-
rian, or else it will be in vain to resort to them in the
Case. Upon the same pretence, if they once gain
this, that miscellaneous Assembly of indifferent & in-
judicious Persons, shall pretend to detect the
Fruits of Trades; and endeavour to recommend to

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besitting Preferments in the University and elsewhere, the ingenuous and learned: and then affairs will be brought to a fair pass. But I enlarge too far, and shall only adde, that I do remit the consideration and purport of this Project to the Tradesmen of London, who are better acquainted then I with the tendency and consequences hee of. Had my Preface to the *Animadversions* upon the *History of the R. S.* come out first, I had there shewed that it is no way my intention by any of these Pieces to detract from any Person of Quality or Learning, that is an *Honorary Member* of that Society, nor from the Institution of it: I must re-
an. ferre my Reader to that, as containing an ample Justification of me, as also a defence of those passages in my life, which I apprehended most obnoxious to their censure. My quarrell lies only with the Comical Wits, who make such a Noise in the world, that in them all the rest are as it were drown'd, who have deviated from the intentions of the Royal Founder, and are so deserted by sober and serious men, that I make it my further Request, that they would inform us what number of Persons are at present actual Members of the Royal Society, and which resort thither, and pay the usual Contributions: and that in their Transactions there may be related what Persons are present each Month: from hence we shall be able to judge what repute they deserve, and what respects we are to pay them.

TO THE
Reader.

THE Discourse of Mr. Glanvill, was the first occasion of my writing about the Royal Society, the provocation which it gave to all sorts of men, of different Professions were such, that it might stir up any publick spirit, to support so common a cause. I was sensible of the injuries he doth unto the dead, the affronts he puts upon the living, the contempt wherewith he decries that University-Learning, and those Studies by which Christianity hath been supported against the Arrians, the Jews, the Mahometans, and of late the Papists and Socinians: and which if they be relinquished, I profess, that I think that the Christian Religion must inevitably fall without the aid of a Miracle. It is a kind of Apostacy from the Nicene and Athanasian Creeds to slight Metaphysicks. The distinction of the Trinity, of Essence and Personality, the Hypostatical Union of the two Natures in our Saviour, and the meritoriousness of his death, (which depends thereon,) are undermined with School-Divinity; and whosoever hath any sense or value for the benefits we derive from Controversial-Divinity, either as to the quieting of his Conscience, or convincing of his Adversaries, must detest this Enterprize of Mr. Glanvill. And methinks that whosoever doth but call to mind that variety of foolish Sects, which gave the Church so much trouble in its first Infancy, and of late years, and considers that they had their Original from want of Logick, should not condemn that Art, by which men argue rightly from sound Principles. It was no less strange to me to finde the names of Reverend, Sage, Grave, Disputer and Logician, perverted into terms of Contumely; yet had not all those Motives prevailed with me, but that he had so defamed the Ancient and Modern Physicians, until those late Innovators, that many importuned me

to revenge my Faculty upon this Insolent Man. Besides, I had been much troubled with *impertinent discourses* of some, who to excuse their *Ignorance* in the *Prognostick* and *Therapeutick* parts of *Medicine*, indulged themselves in the vilifying all the *ancient learning* and *reading*, and asserting out of the *Writings* of the *Society*, the *necessity* and *conveniency* of *new methods*, in *curing* and *abbreviating diseases*. I soon espied my advantages over Mr. *Glanvill*. But perceiving his *Defence* so complicated, with the *History* of the *Royal Society*, that I could not well meddle with the one without reflecting upon the other; I set my self to peruse that also, and found the *Errors* therein so *numerous* and *gross*, and the *tendency* of it so *dangerous*, that it seemed but an *easy*, yet *necessary* work, to the *Universities*, and all *Learning*, as well as the profession of *Methodical Physick*, to write against these new-fashion'd *Philosophers*; I remarked so many *defaults* in both books, that I was at last weary of taking notice of them, there being still *Plus ultra*. I resolve to give my *Studies* no further diversion in pursuing Mr. *Glanvill*; but to leave him to the scorn of some more common *Pens*, who being at the *Universities* may have more leisure than I have at present. After all this *Ostentation of Learning*, the things he talks and writes of are such, as he is utterly unacquainted with: the *Authors* he mentions he never saw, and all his discourse about the *Mathematicks*, and *Mathematicians*, procured him no other acknowledgements from a *Learned* and *Reverend Prelate*, (to whom he sent one of his Books) than a *Reprimand* for intermeddling with what he understood not. Who can choose but smile when he reads how *Apuleius* improved the *Mathematicks* after *Euclid*? who ever heard of such men as *Maximus Planudes*, *Achazen* and *Orentius*? I suppose this last should have been *Orontius*, and he is so famous a *Geometrician*, that when Sir *H. Savill* (as I remember) was to seek for an instance of a pitiful fellow; this was the man he fixed upon; He tells us that the most learned men of all sorts and professions; *Mathematicians*, *Chymists*, *Physicians*, *Anatomists*, *Antiquaries*, and *Philosophers*,

Plus Ultra.
pag. 23.

Page 4.

+ "Illustrated among the Latins"
are the words of Glanvill. p. 22.

phers, make up the *Royal Society*: but one would not guess so by their *History*! He tells us, that the former *Methods of Science* for so many *Centuries*, never brought the world so much *practical beneficial knowledge*, as would help towards the *Cure of a Cut Finger*, which he says is a *palpable Argument*, that they were *fundamental mistakes*, and that the *way* was not *right*. Can any one that hath heard of *Podalirius* and *Machaon* in *Homer* prate thus?

Plus Ultra
Pag. 7. and 8.

Quos tamen Homerus non in pestilentia, neque in variis generibus morborum aliquid attulisse auxilii, sed vulneribus tantummodo ferro & medicamentis mederi solitos esse proposuit. Ex quo apparet has partes medicina solas ab his esse tentatas, easque esse vetustatissimas. Had our *Virtuoso* but known how *Hippocrates* had writ about *Wounds and Ulcers*, and that *Aristotle* himself was descended of the line of *Æsculapius*, and that his Ancestor *Nicomachus* was *Physician* to *Amyntas* King of *Macedon*, And that *Aristotle* also was a *Physician*, and writ several books (besides his *Anatomy of Man*) in that *Science*, and was upon that account valued by *Alexander the Great*, as *Plutarch* saith. And how little the *Ancients* stood in need of *modern discoveries and aids* to cure *Cut Fingers*, any man may judge, that knows what *Scribonius Largus*, and *Galen* (in his books *de Compos. Medicam. sec. genera*) have written: and how this last Author (upon *Philosophical deductions*) compounds several *Medicaments* to that purpose. In the *Augustane Dispensatory*, to this day his *Tripharmacon*, his *Diapalma*, his *Diadictamnium*, and others are recorded. And if any thing rendred *Paracelsus* justly famous, it was the cure of *inveterate Ulcers*, not *green Wounds*: and that therein he did out-doe the *ancient Physicians*, is a question, I cannot grant, and have not leisure to dispute.

Corn. Celsus
in Præfat.

Diog. Laert. in
vita Arist.
Suidas in Ni-
comacho, &
Ammonius in
vita Arist.
Vide notas
Menagii in
Diog. Laert.
l. 5.

He reckons up *Five Instruments* by which the *latter Ages* have improved Knowledge above *Antiquity*. "The *MICROSCOPE*, *TELESCOPE*, *THERMOMETER*, *BAROMETER*, and the *AIR-PUMP*. Some of which were "first invented, all of them exceedingly improved by the "*ROYAL SOCIETY*. But as for the *Telescope*, he con-

Plus Ultra.
Page 10.

'fesses that to have been invented by *Metius* and *Galileo*. Which *Confession* of his, although it take from the *Society* all pretences to the *invention* thereof; yet it is unbecoming an *inquisitive* person, who might upon *better Intelligence* from *Borellus*, in his book about the *Inventor of Telescopes*, published in 1656. He might have learned thence that *Adrianus Metius* of *Alkmaer* did not invent them, but one *Zacharias Joannides* of *Middleburgh* in *Zeland*, (though perhaps *Baptista Porta* had obscurely proposed it) and that he who may most justly come in for a second share in the glory of that *invention* is one *Joannes Lapreius* of the same Town. And whereas 'tis generally written, that *Galileo* was the first who applied those *tubes* to the contemplation of *Celestial Objects*, even that appears to be false, seeing that the first *Inventor*, even *Zacharias Joannides*, (together with his son *Joannes Zacharides*) did make use of them to discover several new *Phænomena* in the *Moon* and *Heavens*. Which mistake is unpardonable in our *Virtuoso* (and his *Assistants*) because that a more particular Enquiry hath been made of late years *hereinto*, then ever before. The *Barometer* he allows to have been first invented by *Torricellius*, not to try the *gravitation* of the *Aire*, but to prove a *vacuum*; Afterwards, the different ascent of the *Quicksilver*, being tried on the *top* and at the *bottom* of *Hills* in *France*, the opinion of the *rising* of the *Quicksilver* from the *pressure* of the *Air*, was introduced and illustrated. But nether is the *gravitation*, or *pressure* of the *Air*, a new opinion; it is as old as *Aristotle*, it is *his*, and he essayed to weigh the *Air*, in his book *de celo* l. 4. sect. 29, 30, 39. He proves the *Air* to *ponderate*, because a bladder full of *Air* weighs heavier than one that is empty. Concerning which Experiment I shall adde the words of *Scipio Claramontius*, that learned Writer, the truth of it having been questioned, "*Possum tamen testari observationem Aristotelis dicto faventem, fuitque diligens observatio, & à diligentissimo pensatore, exactusque stateris & lancibus peracta, me presente & adistente, cum pluribus veritatis cupidis viris: pensitavimus ergo primum sollem novum penitusque vacuum, primo statera quæ solam unciarum differentiam indicabat, invenimusque*

Borel de vero
invent. Tele-
scop. c. 12.

Pecquet. Ex-
per. in 2. in
Diff. Anat. p.
54. Ed. Paris
1651.

Scipio Claramont.
de univ.
vers. l. 14. c. 3.

"venimusque unciarum decemnovem, & totidem reperimus eun-
 "dem follem diligenter inflatum, & solo spiritu nulloque hu-
 "more immisso: ac postea usi sumus lance, qua semuncias quoque
 "indicabat, tumque follem inflatum unciarum decemnovem &
 " & semis invenimus, adeo tamen ut ibi libra in equilibrio abs-
 "que tractu (ut vocant nostri) adamussim permaneret: at idem
 "vacuus non amplius in eodem signo sine tractu, sed cum tractu
 "perstabat. Quocirca verum dicit Aristoteles. So that whe-
 "ther we consider the gravitation of the Air, or its being
 "weighed, (which Mr. Glanvill in his *Plus ultra* thinks so
 "strange of, as he expresses, "To have said in elder Time, That
 "Mankind should light upon an Invention, whereby those Bodies
 "might be weigh'd, would certainly have appeared very wilde
 "and extravagant; and it will be so accounted for some time
 "yet, till men have been longer, and are better acquainted
 "with this Instrument, &c.) The opinion it self, and the
 "attempt to weigh it, is Aristotle's: Nor is this Discourse ca-
 "sually proposed once in Aristotle; but sundry times he avows
 "the gravitation of the Air in his *Problems*, viz. *sect. 11. probl.*
 "*45 sect. 21. probl. 18. sect. 25. probl. 12, 13.* From hence we may
 "judge how well Mr. Glanvill is acquainted with the *tenets*
 "of Aristotle, and how well read he is in him whom he condemns.
 "He and his Philosophick friends dealt only in some pitiful
 "Compendium of *Physicks*, and from thence learned that which
 "was the opinion of *Themistius*, *Simplicius*, and other eminent
 "*Peripatetics*, as if it had been the avowed doctrine of their
 "great Master; and thereupon they thus deliver themselves.
 "And on this occasion, Sir, I observe the incompetency of their
 "judgments, who are Enemies to the real Experimental Philoso-
 "phy, in that they do not (as I intimated) at all, or very little,
 "understand what they condemn. This I have some reason to
 "say, since in the whole Compass of my Acquaintance, which
 "is not very narrow. I profess I know not one who opposeth the
 "Modern way, that is not almost totally unacquainted with
 "it. And on the other side, upon the most careful turn of my
 "thoughts among my Philosophick friends, I cannot light on
 "one of all those that are for the free and experimental proce-
 "dure, but who hath been very well instructed in the *Peripatetick*
 "doctrines,

Plus Ultra
 p. 59. c. 8.

Many *Peripa-*
teticks (as
Claramontius)
 hold that the
 impure Air of
 our Atmo-
 sphere doth
 create itate,
 though they
 deny it as to
 the pure Ele-
 mental Air.

Mr. Glanvill,
 p. 122.

Pecquet. Ex-
per. Physico-
Math. de Va-
cuo. pag. 50,
8cc. Paris
1651.
Mersenni
Phænomena
Pneumat. pag.
140. Par. 1644.

Plus Ultra
cap. 8. pag. 59

"doctrines, which they have deserted, and most of them much better than those who are yet zealous Contenders for them. I might tell our Divine, that the Gravitation of the Air seems proposed in Job 28.25. *Qui fecit ventis pondus*, God is said to make weight for the winds: indeed neither the gravitation of the Atmosphere, nor the notion of Aerial cylinders, pressing upon subjacent bodies, were any News in the world when the Society was first established. But the News of the Barometer is so pleasant, that I will insert the whole passage.

"But (IV.) The BAROMETER is another late Instrument, very helpful to useful Knowledge. That there is gravity even in the Air it self, and that that Element is only comparatively light, is now made evident and palpable by Experience, though Aristotle and his Schools held a different Theory: And by the help of Quicksilver in a Tube, the way is found to measure all the degrees of Compression in the Atmosphere, and to estimate exactly any accession of weight, which the Air receives from Winds, Clouds, or Vapors. To have said in elder Times, that Mankind should light upon an Invention whereby those bodies might be weigh'd, would certainly have appeared very wilde and extravagant; and it will be so accounted for some time yet; till men have been longer, and are better acquainted with this Instrument. For we have no reason to believe it should have better luck than the Doctrine of the Circulation, the Theory of Antipodes, and all great Discoveries in their first Proposals. 'Tis impossible to persuade some of the Indians that live near the heats of the Line, that there is any such thing as Ice in the World; but if you talk to them of Water made hard and consistent by Cold, they'll laugh at you as a notorious Romancer. And those will appear as ridiculous among the most of us, who shall affirm it possible to determine any thing of the Weight of the Wind or Clouds. But Experience turns the laugh upon the confident incredulity of the Scoffer; and he that will not believe, needs no more for his Conviction, than the labour of a Trial. Let him then fill a Tube of Glass, of some Feet in length, with Quicksilver;

"and

“and having sealed one end, let him stop the other with his Finger, and immerge that which is so stop’d into a vessel of Mercury, the Tube being perpendicularly erected; let him then substract his Finger, and he will perceive the Quicksilver to descend from the Tube into the subjacent vessel, till it comes to 29 Digits or thereabouts; there, after some Vibrations, it ordinarily rests. The reason that this remainder of the Mercury doth not descend also, is, because such a Mercurial Cylinder is just equiponderant to one of the incumbent Atmosphere that leans upon the Quicksilver in the Vessel, and so hinders a further descent. It is concluded therefore, That such a Cylinder of the Air, as presses upon the Mercury in the Vessel is of equal weight to about 29 Digits of that ponderous Body in the Tube. Thus it is when the Air is in its ordinary temper: but Vapours, Winds, and Clouds alter the Standard; so that the Quicksilver sometimes falls, sometimes rises in the Glass, proportionably to the greater or less accession of Gravity and compression of the Air hath received from any of those alterations; and the Degree of increase beyond the Standard, is the measure of the additionable gravity. —

There is something so charming and so divertive in this discourse, that I cannot yet dismiss it, notwithstanding what I have said out of Aristotle and Claramontius. That there is gravity even in the Air it self, and that that Element is only comparatively light, was of old made evident by the Man of Stagira: nor did the Schools hold a different tenet, if you take Air for this impure mixture and *Sphæra vaporesa* about the Earth, which we breathe, and in a special manner have to do with: as appears from Claramontius in his Book of the Universe, and Septalius upon Aristotle’s Problems. But Mr. Glanvill neither understands what he opposeth, nor what he Asserts. For in the beginning he speaks of the gravitation of the Element of the Air; whereas that Instrument called a Barometre proposeth only a way to measure the degrees of compression in the Atmosphere, in which Region I believe no man ever denied but that the Aqueous and Terrestrial corpuscles interspersed had their weight and pressure: Thus the ordinary temper of this Air (which is never pure) the al-

Averroes adheres to Aristotle, and holds the Air doth gravitate.

terations of it by vapors, winds, clouds, are the subject of those contemplations, as any man knows that reads Mr. Boyle, or even Mr. Glanvill. Thus all the flourish of Rhetorick comes to nothing, the wonder is ceased, and we come to try only a more particular way of examining the weight of a body, which no man in his wits ever denied to be ponderous. And here I must tell our *Virinoso*, that his reading or consideration extends not so far as to the writings of Mr. Boyle, and the experiment in him. For it appears out of Him that the *Mercurial Cylinder* riseth and falls in the *Magdeburgical Air-Pump*, according to the lessening or vigorating of the *Spring of the Air*: and that upon putting in the *Barometer*, "and closing the *Engine*, there appeared not any change in "the height of the *Mercurial Cylinder*, no more then if the "interposed *Glass-Receiver* did not hinder the immediate "pressure of the ambient *Atmosphere* upon the inclosed *Air*; which hereby appears to bear upon the *Mercury*, rather by vertue of its *Spring* then of its weight. And if this *Phanomenon* proved such in a greater and less *Receiver*, with a greater or less cylinder of *Mercury* (it being indifferent which is used,) I doubt this *Barometer* will not determine the strength of the *Spring of the Air*, much less its weight. For the *Elasticity* is a distinct consideration from the weight of the *Air*: as when some *Experimentators* went about to weigh the *Pike*, the *Flounce* or *Spring of the Pike* was no part of the weight of the *Pike*, though it might turn the *Scales*. This sole consideration destroys all the great promises we have from the *Barometer*, for if the *Spring of the Air* cannot be exactly known, that we must be for ever ignorant of the nature of those other bodies which influence and press upon our *Air*, and compress the *Spring of the Air*, and may have many operations upon it which we know not, neither can comprehend; If the height of the *Atmosphere* cannot be determined, (which I make a *postulatum* of) the alterations in the higher *Regions* are unsearchable, and the *mechanismes* of those *corpuscular combinations* incomprehensible, I shall not doubt to say, that there is not yet found out a way to measure ALL THE degrees of Compression in the *Atmosphere*: nay, 'tis far from

Experiment. Phys.
fig. section.
E. p. 1. 7

Besides, the
difference in
Quick-silver is
such, that all
Writers take
notice of it,
and I am apt
to believe the
Phenomenon
may be much
varied in the
cylinder ac-
cording to
that.

from that *exactness*; for the body of the *Quicksilver* varies not upon *insensible* variations in the *Air*: the *intercepted Air* in it takes off from the *Niceness* of the *Experiment*: and since even *heat*, (and perhaps other circumstances) adds to the *Spring* of the *Air*, it cannot give us that account pretended, about *vapours*, *winds* and *clouds*.

The *Essay* by *Tubes* and *Quicksilver*, as ingenious as it is, yields the *Society* no further *glory*, then to have illustrated it, and perhaps to have made some further *Experiments* in it then those had done, to whom, as the *first Inventor*, (by the concession of the *Historian*) appertains all or most of the Honour which ariseth from such *accessionals*. It is true, our *Virtuosi* fixed on it the name of *Barometer*, but they had done better to have called τὸ ἑξήκα, or εὐτολμία, or *Gas*, or *Blas*, or *Diacetateston*, or some such *unintelligible* name, rather then have termed it thus: the *Appellation* signifying no more an *instrument* to measure the *gravity* of the *Air*, then an *instrument* to weigh a *parcel* of *Tarre*, or indefinitely a *pair* of *Stillyards*. The *Aerometer* might have been a little more *Emphatical*; especially considering that ἀεραμετρὶον and ἀερο-μετρὶον are *Synonymous*. Had not *Aeroscopium* been accommodated to the *Thermometer*, it would not have been much *incongruous*. But I conceive, that *Aerobaricon* or *Aerostaticon* would have fitted the *Experiment* as well as any name I can now think upon. The *Barometer* was invented by *Torricellius* to prove a *Vacuum*, and in *Mersennus's Cogitata Physico-Mathematica*, you may find it applied to the examining the difference of the *Air* in several places. The *Air Pump* was found out at *Magdeburgh*, and not in *England*; it was first published by *Schottus*, under the name of *Instrumentum Magdeburgicum*. Mr. *Boyle* amended it, and prosecuted many ingenious *Experiments* in it, for which all *Philosophers* are redevable to him, but cannot proclaim him the *Inventor* of the *Instrument*, no, nor of the (notion of the *Elasticity* of the *Air*; which was proposed first to the world by *Henricus Regius*, under the name of the *spontaneous dilatation* of the *Air* and illustrated by *Pecquetus*, who first, (that I know of,) spoke of the *Elater*, *Pecquetus* pag. 49 (quem elaterem

Hen. Reg.
Philos Nat.
l. 2 c. 2 p. 4.
& l. 2 c. 3 p.
173 ed. 1661

Torel ubi su-
pra c. 12. p. 26.
Blancanus de
mundi fabr.
part. 3. c. 2.

nuncupo).

The Microscope was invented by the aforesaid
Zacharias Joannides: The Thermometer, or Thermosco-
pium was first the invention of Sanctorius; so Blancanus
saith, *Audivi Doctorem quendam medicum Patavii degen-
tem, qui Sanctorius cognominatur, hujus esse inventorem*
And now I demand of our Virtuoso, which of these Five In-
struments for the Improvement of knowledge have been found
out by the Royal Society: The Thermometer is the discovery
of a Galenical Physician; but as to our Virtuosi nothing ap-
pears but the pretension to other mens discoveries, and the im-
proving of them.

By the Benefit indeed of one of these Instruments, the Te-
lescope, we are put in hopes to find a sure way to deter-
mine those mighty Questions, Whether the Earth move?
or, The Planets be inhabited? And who knows which way
the Conclusion may fall? — I perceive hereby that Mr.
Glanvill is not altogether convinced that the Earth moves;
and I am as little satisfied, that the solution of those Que-
stions is so mighty and important a thing; for if the Earth
stand still, then things will be as they are now: and if it be
determined otherwise, yet shall we not need to fear that the
Revolution of the Earth in its Diurnal motion, either
shake our houses about our ears, or shake us off by the tangent
line: and as for those inhabitants of the Planets, in case
all our other trading should be lost, we shall not finde
out any gainful commerce with them; nor need we
dread that they will piss out our Eyes as we look up.
So that let their Telescopes be brought to that unima-
ginable perfection, whereby to discover the inhabitants of
the Planets as plainly as mites in Cheese, and let the Conclu-
sion fall which way it will, things will fall out no otherwise
than they do.

He inveigheth bitterly against Aristotle for his Heathen-
Notions, and in his Preface to the Clergy of B. & W. wishes that
the devoted Admirers of Aristotle would study his Rhetorick,
History of Animals, and Mechanicks. I wonder he did not re-
commend unto them the perusal of his Ethicks. Certainly
they deserve as much to be read in these days, as any Piece.

And

And perhaps his *Politicks* might contribute something to the instruction of a *Nation*. But how dare here commend any book of that man of *Stagira* to be read, if those motives that swayed him to *Anti-Aristotelism*, be of any *validity*: Alas! he is troubled at his *Heathen-Notions*! Oh! rare *Puritanism*! But my dear Brother *Scruple*, ought any one to be offended at every thing that is of *Heathen-Original*, though it contain nothing of *Gentilisme* in it? Represent your adversary as you please to his *Diocesan*, nothing hath more of the *Presbyterian* and *Fanatick* then this *Topick*. Moreover, what do you think of those *Atoms* and *Corpuscles*? are they not *Heathen-Notions*, and decried by the *Fathers*? what do you think of the terms used by the *Mathematicians*? what of the *Languages*, such as are not *Sacred*? what of the months, days of the year, and the names of the *Stars*, *Constellations*, &c. Must every thing be reformed according to the *Cælum Stellatum Christianum* of *Julius Schillerus*? Besides, these words in *Theology*, of *Unity* and *Trinity*, have as much of *Heathenism* in them, as they have of *Platonism*. I shall here take further notice of his *exceptions* against *Aristotle*, as they are *Recapitulated* here (though they are more largely proposed by him in his *Letter* against *Aristotle*, which I have fully answered in a distinct *Treatise*) the *generall censure* whereof is, That they are nothing but *Lies*, and such as no man that is acquainted with any thing of *ancient Literature* could have uttered. I protest in the *Presence of Almighty God*, that if there be not great care taken, we may be in a little time reduced to that pass, as to believe the story of *Tom Thumb*, and all the *Legends* or *falsifications of History*, which the *Papists* obtrude upon us! This *Philosophy* fairly disposeth us therevnto, by taking us off from the *Pedantism* of *Philology*, and *ancient reading*, and by accustoming us to believe the *forgeries* they obtrude upon us. Methinks herein he is one as absurd as that *Romish Monk* was in the *Pulpit*. *Heresbachius* l. C. citante *Taubmanno*, *audivi*, inquit, *Monachum in Ecclesia declamantem*, *qui, nova, inquebat, jam reperta est Lingua, qua vocatur Græca, ab hac sedulo cavendum: Hec enim est quæ parit* omnes

To Hen H-
tinger in
Smeg. n. Ori-
ental l. i. c.
2. p.

omnes istas hereses. Ea lingua est liber proditus, in manibus passim habetur & vocatur N. T. Plenus hic liber rubetur, & viperis. Alia etiam oritur lingua, quam vocant Hebraeam, hanc qui discunt, efficiuntur Hebraei. We are running on as fast as we can to this condition of ignorance, and shall be so injured to *Historical* untruths, magisterially imposed upon us, and disused from inquiring into them, as to believe any thing. He tells us the *Aristotelian* Philosophy aims at no more, than the instructing men in *Notion* and *Dispute*, that its *Design* was mean, and its *Principles* at the best uncertain and precarious, — One may guess how well our *Virtuoso* understands the *Old Philosophy*, to ascribe that unto it all in general as its aim, which is but the intendment (and that a necessary one too) of the *Dialectick* and *Metaphysical* parts. In *Natural Philosophy* their designs were the same that our *Moderns* boast of, if they miscarried in the main, let us pity their misfortunes, but not blame their intentions. Did *Aristotle* in his books of *Animals*, or *Theophrastus* about *Plants*, instruct men only to *Dispute*? Had his *Anatomy*, and his *Problems* nothing but *Notion*? Must we cast off all *Notions*? Or ought we to endeavour after the gaining of *clear notions of things*? If men hitherto did proceed no further, and yet pretended to be *Peripateticks*, blame the abuse, but condemn not the *Philosophy*, which hath nothing in it that puts a stop to *Enquiries* and *Curiosity*. Nor do I find that those *Physicians*, and others, who advanced the several parts of *Natural Philosophy* and *Physick*, did thereby act contrary to the rules of their *Master* or *Tutors*. It is true, that their *Schools* did meddle but with few points mainly, and those were such as related to *Divinity*, as the *Eternity of the World*, the *Nature of the First and Second Causes*, of the *Soul and its Faculties*, &c. as to an exact *natural Philosophy*, they did not much trouble themselves, nor had we had what we have, but that *Averroes* and the *Physicians* befriended us. But must *Scaliger* and such like suffer under these *Imputations*, which particularly relate unto their *School-Divines*? and must they also be blamed for not teaching nor putting men upon further *Enquiries* than were necessary to that *Christianity*, which they were

to support against the *Mahometans* and *Jews*? He that knows the end of *their* first institution by *Charlemaigne*, can best judge how *prudent* it was, and how they answered *expectation*. But our *Illiterati* know nothing of *that*, and are always reviling *them* where they are not *faulty*, and would have had them neglected that part which was *necessary* to the *Education* of all that were to live *under* and *support* *Christianity*, to pursue *Studies* that contribute *little* thereto, and such as were never *essential* to the being of a *State*, but have been often exploded as *prejudicial* *thereunto*. The same *Apology* may serve the present *Universities*, who do enough in breeding up men to be fitly qualified for *Employments* in *Church* and *State*, and instruct them in so much *Philosophy* as is necessary for the explaining and defending of our Religion against *Atheists*, *Papists*, and *Socinians*: and whosoever shall put the *accurate* debate of *these* *Points*, the *Art* of reasoning, the *Validity* of *Consequences*, the *unfolding* of *critical* *Syllogisms* and *Fallacies*, the *general* doctrine of *Topicks*, the *Moral* *Philosophy*, and *Foundations* of *Civil* *Prudence*, (besides *Civil* and *Ecclesiastical* *History* and *Languages*) which are taught there, or ought to be by their *Constitution*, into the *Scales* on one hand, and the *Mechanical* *Education* (recommended with all the advantages that ariseth from *Aphorisms* of *Cider*, *planting* of *Orchards*, *making* of *Optick* *Glasses*, *magnetick* and *hortulane* *Curiosities*) on the other hand, will be able to judge easily which *Studies* deserve the most *encouragement* by the *publick*, and which are most *useful* and *requisite*. Having said thus much in behalf of our *University-Learning* (which is now *contradistinguished* from the *Mechanical* *Education*) I shall adde thus much in favour of our *Ancestors*, who gave so *solemn* *encouragement* to *Archery*, *Cudgel-playing*, *Foot-ball-playing*, and other *Exercises*, that prepared the *Vulgar* to *Military* *Performances*; as the more *Academical* did the *Gentry* to *State-affairs*: whereas they gave little countenance to the *Experimental* *Philosophers* and *Naturalists*: that the practice is justified by *Vegetius* l. 3. c. 10. *Quis autem dubitat artem bellicam rebus omnibus esse potiore, per quam libertas retinetur, & dignitas propagatur, provincia conservantur & Imperium*

See Mr Sprat,
p. 329.

Imperium? Hanc quondam relictis deſtrinis omnibus Lacedæmonii, & poſt coluere Romani. Hanc ſolam hodieque Barbari putant eſſe ſervandam: cætera aut in hac arte conſiſtere, aut per hanc artem aſſequi ſe poſſe conſidunt. Hac dimicaturis eſt neceſſaria, per quam vitam retineant & victoriam conſequantur. But to

return to our Virtuoso! Are not the principles of Des Cartes, and the figured Atoms of Gaſſendus as precarious as thoſe of Ariſtotle, and leſs ſubjected to ſenſe? Have not the Chymical Principles ſo much of uncertainty, as they have of Equivocation? Are not they precarious too, and ſuſpicious? Are there any of thoſe that agree amongſt themſelves? and do not they as little agree with Nature as thoſe of the Peripatetick way? I will not doubt to maintain

Analogiæ ſi accipiantur hæc Chymico-
ſta principia æſſentiri eis poſſumus, ita ut
pro Mercurio aqua ponatur, Sulphure ignis
& aer, & cetera. Analogiâ negatâ negatur
omnia coabire. Ex aqua & terra faciliſſimam
viſibilem, & hunc curâ conglutinari & con-
creſcere in lapidem: quemadmodum natura
in æræ videmus. Si hæc reſolvatur in ultima
non in Mercurium, Sulphur, & Salem, ſed
in vulgata & Phyſica reſolvetur principia.
M. Ruſland. *Progygn. Alchym. L. 2. c. 10.*

that as far as *Phyſick* is concerned in the debates; The ancient *Philosophy* better agrees with the *Phænomena* of *Nature*, and carries us on with more aſſurance to work (as they phrase it) then any other, and that the diligent reading of *Valleſius*, *Mercatus*, *Saxonia*, *Claudinus*, &c. ſhall produce better *Phyſicians* then *Sylvius*, *Helmont*, or *Odorode*. And whoſoever reſolves any of the other *Queſtions* in the *Negative*, whatever he pretend, hath never conſiderately ſtudied the *Points*. Give therefore the *Ariſtotelians* leave to hold an *Hypotheſis*, which is accommodated to the *polity* of our *Nation*) at leaſt as *revocable*, till a better be introduced; and do not proceed in an exterminative way, till ſomething elſe be ready to be ſubſtituted.

If *Notions* might be rejected for being firſt propoſed and uſed by *Heathens*, then is not *Ariſtotle* in a worſe condition then *Epicurus*, *Democritus*, *Plato*, or *Pythagoras*; If *Impiety* in the *Teacher* may authorize us to reject doctrines not *impious*, I think the condition of our *Stagirite* not to be worſe then that of other ancient *Philosophers*, and better then ſome of the *New*. That there is *impiety* enough in *Gaſſendus's* Answer to *Des Cartes*, any *Chriſtian* will grant, eſpecially if he be a *Proteſtant*. And the life of *Des-Cartes* had

had but little of the *Saint*: this is manifest. And I desire Mr. *Glanvill* to acquit *Paracelsus* from being *impious* in his life, and many of his *doctrines*. If he was a *Corrupter* of the *Wisdom* of the *Ancients*, for *misci-*
ting, and *misrepresenting* their *opi-*
nions; and must therefore be *condemned* and *rejected*: who can approve of Mr. *Sprat*, Mr. *Glanvill*, and their *Adherents*? He saith, that *Aristotle* was of no such *superlative Account* in the *wisest* times. But he tells us not which those

most wise times were, when he was in *disesteem*. I have not read of any more wise people, then *Greece*, *Rome*, and the *Mahometans*, under their first *Caliphs* and King *Almansor*. And yet all these admired him at several times. He that chargeth *Philip* of *Macedon*, *Alexander* the Great, and his *Successors*. (particularly the *Ptolomyes* of *Egypt*;) with *Folly*; and *Sylla*, *Tully*, and those other *Romans* that admired him, with want of *wisdom*; Or, who thinks that the *Empire* of the *Moors*, and their *Academies* at *Bagdad*, *Fez*, and *Cordula*, were composed of a sort of *Simpletons*, may go seek for the *wise* and the *prudent* in *Gotam Colledge*. And perhaps those *Christians* that celebrated *Aristotle*, and advanced him to that *repute* in their *Kingdoms* and *Universities*, were not *Idiots* or *Changelings*. That He was much *opposed* and *sighted* by the *first Fathers*, is an *Objection* that hath some truth in it, but not much to the *particular* prejudice of our *Stagirite*. For at first they hated and detested all *humane Learning*, and *Philosophy*; and when they came any of them to admit of those *Sciences*, then they divided into the *Aristotelians* and *Platonists*, as they did into *Arians* and *Catholicks*: That the *Arians* were *Aristotelians*, is to me as evident, as that *Mahomet* taking the advantage of that *faction*, and of the *brutal* lives and *ignorance* of the *Catholiques* depending upon the *Patriarch* of *Constantinople*, did advance the *Sect* of *Christians*, called *Mahometans*; and his *Successors* the *Caliphs*, did

I cannot finde any ground to conclude *Aristotle* so wicked. If we impute him for having an hand in poisoning *Alexander*, (which perhaps is not true). In his last Will, there is much generosity: in his life, many testimonies of a singular vertue: in his discourses much wit and worth. He writ an *Apologie* for *Piety*; got the walls of his destroyed country to be rebuilt, and made excellent Laws for it. *Philip* chose him to breed up *Alexander*. And those are greater assurances that he was not so wicked, as he is reported by his adversaries. They repeat nothing but old lies, such as *Apellison* refuted: and *Aristotle* saith, ἀποδύω τὸν ἄνθρωπον. See *Cassian* upon *Diog. Laert.*

Let us see that the *Virtuosi* would enquire after the *Peripatetick* Philosophy, at *Alexandria* after the *Ptolemies* and not at *Athens*. And when they have done that, and studied the condition of *Christianity*, during the time of the *Arrians*, and enquired into the rise of *Mahomet*, the circumstances that advanced him and contributed to the spreading of his doctrine, and increase of that Empire under the *Caliphs*, then they will be able to judge of the truth of what their *Historian*, and Mr *Glanvill* writes in the books animadverted on, and in his Letter concerning *Aristotle*.

wholly employ themselves to improve the doctrines of *Aristotle* and the *Peripateticks*. So that *Aristotelism*, *Arianism*, and *Mahometanism* issued out of the same parts of the world, viz. *Alexandria*, and the adjacent Countreys: Nor was it Chance or the black ignorance of the Age, but great prudence in *Charlemaine* and his Successors in the West, that brought in *Aristotle*: as anyman will say that un-

derstands the circumstances of those dayes. But so much History is above the reach of my *Experimental Philosopher*: To supply that defect, *Christians* must be once more told, that since their minds are enlightned with the rays of the glorious Gospel, they have less reason to bow down to the Dictates of an Idolater and an Heathen. And so farewell to the Rhetorick and other works of *Aristotle*, which our *Virtuoso* a little while agoe recommended unto us. Let us shake hands with *Seneca*, and *Epictetus*, and *Plato*: and joyn with *Tertullian* in that saying. *Nobis Philosophia opus non est post Iesum Christum, nec Aristotele post Evangelium*. Having said thus much to these grand accusations against *Aristotle*, with which Mr. *Glanvill* was so perplexed, I suppose he may think that a more devout Admirer of *Aristotle* then I am, with more time, may say enough to convince him, that it was his fault, and not the *Peripateticks*, that he benefited so little by them. And I pray what language did *Epicurus*, *Pythagoras*, and *Philolaus* make use of? He writ better about divine things than *Plato*, as *Vossius* witnesseth, *Quaquam multa de Deo scripta sunt a Platone, accuratius tamen apertiusque de iis egit Aristoteles*. He cites a passage of *Plato*, ο θεός γεωμετρῶν, and adds, that the Universe must be known by the Art, by which it was made. If it be not to be known any other way, it is unintelligible. Let him answer Dr. *More's* Dialogues upon that point, where he explodes the Mechanism of Nature: and reckons upon *Des-Cartes* as the most prodigious Fool that ever was, for holding that opinion. I shall adde, that *Geometricians*

tricians are commonly a sort of men, that being once got out of *their Science*, they are far from being elevated and improved thereby: And the reason is, because that the severe procedure of *Mathematical demonstrations*, and *their ways* they take to demonstrate things appertaining to *their Science*, these do not qualify a man at all for those *argumentations* which sway and guide in *Metaphysics*, *Ethicks*, *Politics* and *Religion* it self. Upon this account *Aristotle* observed, that a *child* might become a *Mathematician*, but not a *Politician*, or *Moralist*. Hence it is, that *Geometricians*, (except their studies have particularly acquainted them with those *Dialecticks*, which regulate the generality of Mankind in such discourses,) seldom, if ever, prove *Metaphysicians*, *Religious*, or otherwise of tolerable *ratiocination*: either rejecting as false, frivolous, and indemonstrable, those reasonings and studies, according to which humane affairs are regulated; or else ignorantly, running into *Whimseys*, and phantastical ways of arguing. Neither is this more manifest, then I think these two Conclusions are, which I deduce from thence in opposition to some *Comical Wits* in their *History*, viz.

That by how much more general as to publick and private use and emolument in order to domestick affairs, or *Civil Prudence* and the preservation of *Humane Society* and *Government* those things are, which depend upon *perswasive Arguments*, and those *topics* and methods of *ratiocination* which are laid down by *Aristotle*, not *Euclide*: by so much those courses ought to be pursued, upheld and encouraged by understanding *Statesmen* which are subservient thereunto, above the less necessary and inutile *Mathematicks*.

Next, That the *Mechanical Education*, or that whereby Youth are inured at first to *vigorous demonstrations*, and necessary deductions from evident Principles, and a *Philosophy* that is purely *Corpuscularian*, ought not to be premised or preferred to other studies in order to the fitting men for humane life: seeing either accidentally, (yet so, as in regard of our depraved nature it is almost unavoidable) or intrinsically those courses dispose mens minds afterwards to *Atheism*, or an indifference in *Religion*, and inhabilitate them towards those more

important, but less delightful studies of Law, Policy, and Religion, with their several dependencies.

I finde that *Aristotle* hath complained of some, that in their Explications of Nature made too much use of *Geometry*. *Magnenus* hath complained also of them; and *Conringius*, *Bullialdus*, and *Ricciolus*, of *Kepler*; and *Bodinus*, in his *Theatrum Naturæ* l. 5. and all *Physicians* almost of *Des-Cartes* his ridiculous book *de Homine*. And if *Plato* was so solicitous, that none but *Geometricians* should come into his School, yet he sent them very fools out, if they allowed of his *Logick* and *Physiology*. I shall leave the further defence of *Aristotle* to others; only I must tell him, that *Vossius* in his account of *Geometricians* allows of *Aristotle* for no mean one. And we find that he supposeth his Scholars not ignorant in *Geometry*, since without that knowledge they could not understand his *Analyticks*, nor that part of his *Etbicks*, where he illustrates *Justice* by the *Arithmetical* and *Geometrical proportions*. And as for his *Etbical* opinions, it is ridiculous to upbraid the *University-Learning* with them, since they are not taught, but solidly refuted there. However if *Aristotle* must suffer on this Account, let not *Epicurus* triumph.

Vide Ricciolam in Almagest nov. l. 4. p. 278.

See Mr. Parkers censure of the Platonick Philosophy.

Vide Blaucanum in loca Mathematica Aristotelis.

Epicurus Mathematicis insuper habuit unde ut *Plutarch*, ait libro contra *Epicurum*. Philosophum quendam nomine Apellem, eo nomine laudabat, quod ab adolescentia nunquam esset contaminatus disciplinis Mathematicis. *Vossius de Philosof.* l. c. 8 § 27.

He tells us that *Archytas*, that great *Geometrician* was scared from *Mechanical* and *Organical Methods* to the great hinderance of beneficial Improvements that way, so that he kept himself up in *Abstractive Contemplations*. I cannot finde any such thing in his life written by *Diog. Laertius*, but the contrary, ὅτι ὁ πρῶτος τὰ μηχανικά ταῖς μηχανικαῖς περιγρηάμενος ἀρχαῖς ἐμεθώδευσε, καὶ πρῶτος κινήσιν ὀργανικὴν διαγέγραμματα γεωμετρικῶν προσήγαγε. He made a Pidgeon of wood artificially to flie. So *Favorinus*. Ἀρχύτας ταχέως φιλόσοφος ἀνα καὶ μηχανικός ὢν, ἐποίησε περισσεύαν ζυγίον, πέλο ἐνν ὅτι ἐπὶ τοῖς καθίσαιεν, ἐκέτι ἀνίστατο. I wonder oftentimes how He did to commit so many mistakes; and I cannot believe that He or his *Philosophick* friends were ever well instructed in the *Peripatetick* doctrines, who are so ill taught in all manner of *Humane Learning*. I resign him up to

Diog. Laert. l. 8. in vit. Archytæ.

Collins X. 12.

to be the scorn and entertainment of others henceforth. Nor will I engage particularly in the dispute betwixt him and Mr. Cross. I am informed, that the *Relation* is very false; and I profess I have no mind to believe this *Virtuoso* in any thing he says. It is easie for him to misreport a *private discourse*; His great and admired friend Mr. Sprat relates general Encounters false; He tells us, "Of a mischance that befel the Christian Army in Egypt in the time of the Holy Warre. Their strength was great and irresistible, if they had only understood that which every Egyptian could have taught them, the course and the time of the overflowing of the Nile. For the want of that slender knowledge, the bravest men of all Christendome, were led up to the Neck in the River, and were forced to yield to the Enemies conditions without striking a stroke. This was occasioned by the stupidity of the Cardinal who commanded them. If he had been less skilful in the Schoolmen and more in Nature, that dreadful disaster had never happened. — Such an untruth as the Historian tells here, such perhaps is the Narrative of what passed betwixt him and Mr. Cross. I cannot finde any such Story in *Fullers Holy Warre*, but the contrary, viz. "Egypt is a low level Countrey except some few advantages, which the Egyptians had fortified for themselves. Through the midst of the Land runs the River Nilus, whose streams they had so bridled with banks and sluices, that they could keep it to be their own servant, and make it their Enemies Master at pleasure. The Christians confidently marched on, and the Turks perceiving the Game was come within the wile, pierced their banks, and unmuzzling the River, let it run open mouth upon them, yet so that at the first they drowned them but up to the middle not to the neck. There is no body charges the Cardinal Pelagius, who was Legate, and commanded the Army there, for invading Egypt in an unseasonable time, nor with being ignorant of the time when Nile did overflow. The Christians were not ignorant of that, who had discovered and invaded Egypt before in 1218, and this was but two years after in 1220. The Egyptians, 'tis true, dammed up the River (which was now low) and upon the approach of the

Hist. of the
R.S. Pag. 411.

Fullers Holy
War, l. 3. c. 27.

the *Cardinal* cut their banks, and so gained the victory. That the *Cardinal* was no *Souldier*, and unacquainted with *Stratagems* of war, I grant; and for this *Historians* condemn him, but not for being ignorant of that part of *Natural Philosophy*. A Member of the *Royal Society* published lately an account of the *Original of Nile*. The Description had nothing of *News* in it to any *Scholar*, that was material. But they should have procured an account of the manner of the inundation of *Nile*, for the *Historian* is more ignorant than the *Cardinal* of it. Had it been the time of the beginning of the overflowing of *Nile*, they might have retired easily to

Prosper. Al-
pin. d. M. d.
Agri. l. 1. c. 8

Damiata without damage; for it never exceeds in rising above ten inches each day, sometimes it riseth not eight

inches. Just such an Account, I fear, doth Mr. *Glanvill* give of Mr. *Cross*'s discourses, whom report speaks so advantageously of, that we must give the Lie to *general fame*, or believe him a *very learned Person*, as well as *pious*. Perhaps he, as well as my Lord *Bacon* might suspect the truth of those *Telescopes*. And perhaps also he might be mistaken in saying that *Aristotle* did travel all over *Asia*: yet, however that, that *Jonssius* (*de Script. Philos. l. i. c. 18.*) disproves that opinion, yet no less man then *Josephus* l. 1. adv.

I know not what *Logick* Mr. *Glanvill* read at *Oxford*, but his *Ignoratio Elenchi* in him, to suppose what Mr. *Cross* might say about *Asia* as twas of old named, and bounded, and travelled over, with the new discoveries of *Cibola*, *Japan*, &c. which rather constitute a fifth part of the world, then are included in *Asia*. That is *Asia*, which they imported that gave it the name, not what others add to it. By the same *Sophistry* it may be said that the former *Kings* were not *Kings* of *France*, because late *Conquests* have enlarged the borders.

Not was *Aristotle* implicitly guided by the relations of those *Hunters* &c. he diligently inquired into their reports, and oftentimes refutes the vulgar stories. See this particularly asserted by *Federicus Bonaventura de partu Octometris* l. 1. c. 6.

Apionem, was deceived as well as Mr. *Cross*. *Solinus* also c. 14 and *Ammonius* in the life of *Aristotle* say, that *Aristotle* did accompany *Alexander* in his *Asiatick Expedition*. And I profess my self in an errour as well as Mr. *Cross*, if it be not true, that *Aristotle* had sundry advantages to pen his *History of Animals* which our *Virtuosi* want. *Pliny Nat. Hist. l. 8. c. 16.* saith, *Alexandro Magno rege inflammato cupidine animalium naturas noscendi, delegataque hac commentatione Aristoteli, summo in omni doctrina viro, aliquot millia hominum in totius Asiae, Graeciaeque traclus pervenire jussa, omnium quos venatus, aucupia, piscatusque alebant: quibusque vitaria, ar-*
menia,

menta, alvearia, piscina, aviaria in cura erant: nequid usquam gentium ignoraretur ab eo: quos percontando, quinquaginta ferme volumina illa praeclara de animalibus condidit.

Let a man now consider the greatness of *Alexander*, the impatience he had to effect his purposes, how generous he was in acknowledging Services, and how vindictive when neglected, and how understanding to know what was done and omitted: Let any man consider this, and he will think that *the Society* have not a Patron that interesteth himself so much as *Alexander* did for *Aristotle*. He had several thousands commanded to give him intelligence: their number transcends any that ours can pretend to: their quality is such as the *R. Society* wisheth for, viz. Intelligence from the constant and unerring use of Experienced men, of the most unaffected and most unartificial kinds of life. And if notwithstanding all these circumstances *Aristotle* were abused or mistaken, or defective in his Narrations, I am confident there is less credit to be placed in the Narrations of some of our *Virtuosi*; who have been so mistaken in their Accounts of *Cider* and *Salt-Peter*, domestick Enquiries; what man will give himself the trouble to inform them, either at home, or abroad? with what negligence and imperfectness will they register things? how unphilosophical will their memoirs be? How will they be able by intreaty to procure a second information? That there are more parts of the world discovered and sailed unto then in *Aristotle's* time, I grant. But what certainty shall we have of Narratives picked up from negligent, or un-accurate Merchants and Seamen? What judgement have these men of no reading, whereby to rectify or enlarge their Enquiries? Mr. *Glanvill* doth not so much as know who writ well upon the several subjects, in which he pretends that the *Moderns* have out-done the *Ancients*. As Improvers of the *History of Bathes* (by the way we are far inferior to them in the practice of *Bathing*) he reckons *Savanarola* for one: he might as well have recounted *Bayrus*, *Gordonius* and *Gatinaria*: or any of the barbarous Physicians, for advancers of the practick: He might have told us of a Volume of Writers *de balneis*: But why did he omit *Soliman*

Mr. Sprat. P.
257.

nander de thermis, *Libavius*, and our *Dr. Jordan* (who lived at our *Bathe*) and *Baubin* *de fonte Bollenfi*, and the other Writers about particular *Bathes*? Alas! He knew them not: nor did I ever hear any man commend *Blanchellus* upon that subject. About Minerals, could he not have named *Encelius*, *Cuspalpinus*, *Fallopianus*, and *Lazarus Erkerus*, whom I find by some to be preferred before *Agricola*? In his Account of remote *Histories of Nature*, could he remember the Author of the *Caribby-History*, and pass by *Carolus Piso*, *Burzgravius*, and *Bontius* about *Erassile* and the *East Indies*. So where he speaks of discoveries made by *Microscopes* (pag. 57.) by naming only *Dr. Power* and *Mr. Hooke*, ingenious *Mechanicks*, Members of the *Royal Society*; he seems to intimate, as if none but the *Virtuosi* had proceeded in that adventure, whereas *Petrus Borellus*, Physician in ordinary to the King of *Erance*, published a *Century of Microscopical observations An.Dom. 1656*. such as have (if true) more of utility then those of *Mr. Hooke*, though less of curiosity, and destitute of *Cuts*; and *Kircher* after many years employed in those contemplations, *per exquisitissima Microscopia*, did publish several Experiments of that kinde, in his book *de Peste*; and *Nicolaus Zucchi* about the same time (1656.) published a short account of *Microscopical observations*, about a *Louse*, a *Flea*, the feathers of a *Peacocks tail*, &c. encouraging others to prosecute the work. He tells us, (pag. 56.) "that the discoveries by *Telescopes* may inform us of the *Longitudes*: upon which must needs ensue yet greater improvements of *Navigation*, and perhaps the discovery of the North-west passage, and yet unknown South. I grant that the invention of *Longitudes* will be extremely beneficial to man-kinde in point of sailing: and the *R.S.* have made great boasts how that it shall be achieved by their *Members*; and thereupon caused some projects to be rejected, which yet perhaps would have proved as unfeasible as the attempt of *Galileo's*, to calculate it by the *Medicean Stars*. I desire much to see the happy result of our *Virtuosi*, though the consequences here affixed to it, as *Improvements* was very defective. I shall propose some *Scruples* about the *North-west passage*, and

Kerch d. P. fl.
165. 1. c. 7.

Nic. Zucchi
Philos. optic.
part. 2. lib. 3. c.
7. fl. 4. p.
348.

and the utility of its discovery, as also of the hopes of finding out the *Southern Tracts*.

First, I say that the story about the streights of *Aman* is very improbable, if not certainly a *Fiction*. It hath been so thorowly search'd into by our Nation, that there is no encouragement to a further trial: and this Streight of the *North-west* passage, is indeed nothing but a narrow difficult passage to *Button's Bay*, the entrance being properly called *Hudson's Streight*, in regard of his first finding it; the mouth whereof lies in 62 degrees. But were there such a passage, it would much more concern the *Portugals*, and the *Spaniards*, and *Dutch*, then it doth the *English*; for their trade is to the *North-part* of the *East-Indies*, and ours to the *South*; theirs to the *Moluccoes*, *Philippinas*, *Japan*, and *China*; whereas we seldom pass beyond *Bantam* in *Java*.

Secondly, were there a passage that way, yet it were not to be chosen before the other: for, could a man sail in a *strait line*, first from *England* to the *Streight*, and thence from the *Streight* to the *East-Indies*, it would prove a further way then the other by the *Cape of good Hope*. But those that know any thing of those Seas, know that the Sea-Course to any part of *North-America*, is as low as 23, 24, 25, or 30 the highest by reason of the *winde*, which bloweth in the *South-sea* East and West, as well as in the North, that is to say, for the most part West without the *Tropicks*, and almost constantly East within them. Wherefore you must go out of your way as well from the North-part of *America* to the *East-Indies*, as from *England* to this supposed *Streight*; and there is as much difference in relation to pleasantness in the Voyages, as between *Summer* and *Winter*. For when one is clear of the Bay of *Biscay*, in all the Voyage by the *Cape* you find no cold weather till you return to the same place again; but on the contrary, it is so cold and icy about the *Streight* in the middle of *Summer*, that there is no making way without much difficulty and trouble. And in the *South-Sea*, where the *Sunne* keeps the same course as in the North in *June*; *Sir Francis Drake* in compassing the world, found so much cold in thirty eight degrees of North-lati-

See Mr. Gardiner in his description of *America* c. 25. where he protesteth to write nothing out what his own knowledge, or good intelligence persuaded him unto, he having lived long in the remote parts of *America*: the loss of whose large Account thereof we may deplore.

Judge hence what hopes there is of making discoveries in the *Southern Tracts*.

tude, that he was forced into a *Southerly* course. Besides, if we may take a conjecture from the *windes*, which have blown when the Undertakers for that discovery passed into those *Streights*, one would guess by their *great coldness*, that they did *blow from the Land*, and consequently that there is no Sea to the North of *America*, but that the Land of this *New World* reacheth by the North parts, even to the Northwardly Provinces of *Tartary*, &c.

I am surprized to finde, that Mr. *Glanvill* doth not make the *Moderns* to surpass the *Ancients*, in *Architecture*, *Sculpture*, *Picture*, and several other Arts of *ingenious Luxury*. That he doth not advance the glory of our *Mathematical burning-Glasses*, above the *Specula Ustoria* of *Proclus*; and the Artificial Fires of our *Virtuosi* above those invented by *Calliclinus*, when he burned the *Saracens Fleet*.

But not to upbraid him with what he hath omitted: I shall resume the discourse about *Telescopes*, and their *fallaciousness*, wherein if Mr. *Croft* was a little *doubtful*, yet Mr. *Glanvill* is so *assured*, that he makes an ample recital of the *contest*, and the advantages he gained in it. I shall set down his words, the better to divert my Reader, and to shew how insupportable such kind of men are in all *judicious* and *intelligent* company.

Mr. *Glanvill*
Plus Ultra. c.
9 p. 65.

"To my Discourse about the *Dioptrick Tubes*, the *Telescope* and *Microscope*, the *Reverend Disputer* replied, [*That our Glasses were all deceitful and fallacious*] Which Answer "minds me of the good Woman, who when her Husband "urged in an occasion of difference, [*I saw it, and shall I not "believe my own Eyes?*] Replied briskly, "Will you believe "your own Eyes before your own dear wife? And it seems "this Gentleman thinks it unreasonable we should believe ours, "before his own dear Aristotle.

"For an assurance of the credit of those Glasses, I told him "he might try them upon objects near, and easily visible by the "unassisted sight; and if he made the trial, he would finde "they altered the objects in nothing but their proportions, "which are represented larger for the advantage of vision in "things small and remote; and we have all the like reasons to distrust

" distrust our Eyes, as these Glasses (for their insinuations
 " are the same in all things, but the mentioned difference) and
 " there is no man so much a fool as not to make allowances
 " for that. Never was any yet so grossly deceived by the Micro-
 " scope, as to be perswaded that a Flea is as big as a Leicester;
 " nor did the Telescope ever make any one believe that the
 " Moon was at the end of his Tube: But if the former repre-
 " sents that little Creature as bristled and jamar'd, and the o-
 " ther makes the Planet mountainous and uneven, we have no
 " reason to believe but that their reports are sincere, though
 " our unaided Senses are too gross to perceive either the one
 " or other; since, if the mentioned bristles and jamars are
 " in the Glass, and not in the Animal, they would appear in
 " like manner in all the small Creatures which in the same
 " light and position are look't on through the Microscope:
 " And if the ruggedness of surface were in it, and not in the
 " Moon, the same would be seen upon all other distant Ob-
 " jects, that are view'd through the other Optick Instrument.
 " And if there be deceit in those Glasses, Seamen had need
 " beware how they trust them, since the Flags which appear
 " to be those of their Friends in the Perspective, may be re-
 " ally the Colours of their Enemies.

" Upon these Accounts, Sir, which afford plain and sen-
 " sible evidence, I wondred much at the Fishmongers strange
 " suspicion, which had been scarce pardonable in a vulgar head;
 " and I know not what to call it in one, that would be
 " thought a Philosopher: But the wary man gave a reason,
 " which made me as much wouder at his Argument, as
 " his Doubt. And to this attend Ye Philosophers of the ROY-
 " AL COLLEDGE, and prepare your selves to answer a
 " Demonstration from Experience against your Glasses; Raise
 " your Expectations for a wonderful, convulsive Experiment;
 " Let the Mountains travel, and the Birth will follow. [Take
 " two Spectacles (saith the Experimental Sage) use them
 " at the same time, and you will not see so well as with one singly.]
 " therefore your Microscopes and Telescopes are impostors.
 " This man, Sir, is a Logician, and no doubt you perceive so.
 " O how I admire this rare faculty of arguing! How dull are

"our *Wits*, to those *subtile*, *Eagle-ey'd* *Schoolmen*, who see
 "Conclusions so far off, through the more *unerring* *Telescopes*
 "of their own piercing *Understandings*? Did ever *old man*
 "before make *this* use of his *Spectacles*. But to leave won-
 "dering, let's endeavour to understand this *Philosophy* of
 } "CHIC. How a man may see by *Spectacles*, that *Perspectives*
 "are *deceitful*. [*We can see better through one pair, than two*]
 "saith the *deep* *Philosopher*. Most *sagely* observ'd! The
 "Argument begins *strongly*: But in the name of *Aristotle*,
 "whence comes the *Consequence*? Therefore *Perspectives* are
 "fallacious.

"One Proposition for Sence,
 "And th' other for Convenience.

"This fits his purpose to discredit *new Discoveries*, 'tis no
 "matter how it follows. This *Gentleman*, you must know,
 "Sir, useth to have his word taken among his *admiring* *Neigh-*
 "bours, and so is not wont to be put to the trouble of *pro-*
 "ving: but I was so *unmannerly* as to expect it, chusing ra-
 "ther to see with mine own *Eyes*, than his *infallible* *Spe-*
 "ctacles. *We can see better* — saith the *Disputer*. How
 "doth he know that? If *Perspectives* deceive us, though
 "naked sense witness for them. Why may not his *single* *Spe-*
 "ctacles be as *deceitful* as they? These represent things *big-*
 "ger than they are to the *unaided sight*; and the *Philosophi-*
 "cal *Glasses* do but the *same thing*, in a *higher degree* of
 "magnifying the *Object*. But we allow him the benefit of
 "his *single Spectacles*, though he will not be so courteous to
 "our *Glasses*, and confess his *Reverend* *Experiment* of the
 "use of *two*, but are *inquisitive* about the *Consequence*. The
 "Reason of which certainly must be, (if any be intended in
 "it) that our *Telescopes* and *Microscopes* have a *Glass* at each
 "end, which the *Man* of *Sapience* thinks answers the two
 "pair of *Spectacles*, and therefore must render the *Repre-*
 "sentation *deceitful*. If this *Philosopher* had spared some of
 "those thoughts to the *profitable* doctrine of *Opticks*, which
 "he hath spent upon *Genus* and *Species*, we had never heard
 "of

" of this *Obj-ction*, which is as much a reason against the credit
 " of all *Perspectivè Glasses* whatsoever, as the *Philosophical*
 " ones he would discredit. And without more *Opticks* than
 " those of *natural Understanding*, he might, if it had pleased
 " him, have known, that we see better through the *two Glas-*
 " *ses in Perspectives*, then any *single one*; because they are
 " so fashioned and ordered, that the *visive rays* are better ga-
 " thered and united by them for the advantage of sight: But
 " in the *two Spectacles*, the case is contrary. These things
 " I suggested, and some others from the *Dioptricks*, in which
 " this *sage Person* was pleased then to conceal his Know-
 " ledge; and how great that was in these matters, will ap-
 " pear by the *Learned Problem* he proposed at this period of
 " our Discourse, [*Why we cannot see with two pair of Spe-*
 " *ctacles better than with one singly?* For, saith the *Man*
 " of *Ætious*, *Vu unita fortior?*] A pleasant piece of *Philoso-*
 " *phy* this; And I'll shew the *Disputer* how strongly he in-
 " fers from his *Maxim*, by another Question like it. Why
 " cannot he write better with *two Pens* then with a *single one*,
 " since *Vu unita fortior?* When he hath answered this *Quare*,
 " he hath resolved his own. I said in the Discourse, That
 " the reason he gave why one would expect it should be so,
 " is the reason why 'tis not; and this is plain enough to
 " sense, from the confusion of *Vision*, which shews, that the *rays*
 " are not united after the way requisite for the aiding the
 " sight (as I just now intimated) and how that should be, I
 " had here shewn, but that I am ashamed to adde more in
 " earnest about a grave foolery. —

Upon this Discourse, the first Remark I shall make is,
 That Mr. *Glanvill* hath little or no insight into *Opticks*, and
 is in a manner as ignorant in that profitable Science, as he
 represents his *Adversary* to be. It is something for a Man to
 be able to give an account how he spent his time, though a-
 bout *Genus* and *Species*; rather then to appear to have idly
 pass'd it away, without acquiring any knowledge at all. The
 solution of Mr. *Cross*'s fallacy, (if it were his) by that Inter-
 rogatory, *Why cannot he write better with two Pens, then with a*
single one? is ridiculous, since there is no *vu unita* there:
 and

Vitrum Sphaericæ capum, dilatando radios per ipsum transmissos amplificat notabiliter imaginem si in debita distantia continuatur post Sphaericæ convexum. Zucchini phil. opt. part. 2. tit. 1. c. 7. sect. 5. pag. 360, 361, 362. How it is in Telescopes made up of all convex-Glasses, the same Author shews there: and so doth Kepler in his Disputicks.

Zucchini phil. opt. part. 2. tit. 3. c. 7. sect. 5. p. 358.

and in one sort of *Tubes*, though the rays be united in the first *convex-Glass*, and brought to a *Convergency*, yet must the *Spherical Cavity* of the next *Glass* dilate again, and dispose them fittingly to effect the expected *vision* in the *Retina*: and besides this, it is

requisite that the *Tube* be so fitted unto the eye (not to speak of the fitting it differently according as the *Medium* is) as to exclude all other impressions and radiations, that may divert and impede the sight, viz. *Ad consulendum sufficienti determinationi potentia per languidiorem & angustiore impressionem à remotioribus, multum prodest, si ex forma instrumenti & ejus applicatione ad Oculum vel ex conditione loci è quo per instrumentum remotiora, & in minori amplitudine apparentia prospeclamus, impediuntur radiationes aliunde intra oculum simul & semel diffusa, præsertim valida.*

As to what Mr. *Cross* is said to have argued against *Telescopes*, that the addition of one *Glass* to another must hinder rather than improve *vision*, because that the superadding of one pair of *Spectacles* to another, rather weakens then amends the sight. I must say, that whosoever understands the forming of an *Argument* cannot except against the form of that, nor do the *Propositions* cohere so ill together, as that one should be as it were for *sence*, and other, for *convenience*. All that excursion of our *Virtuoso* shews his *Ignorance*, not Mr. *Cross*'s. 'Tis one thing to except against the form, another thing to except against the matter of a *Syllogism*. I confess there is reason enough for to do the latter; but now for the other procedure. I believe such a dispute was never heard of since the declining of *Arcadia*, as this was: If Mr. *Cross* did urge this otherwise then to try the *Intellectuals* of Mr. *Glanvill*, (concerning whose *inhability* he might be well satisfied) there is no defence to be made for him, otherwise then that he was unacquainted with a sort of knowledge which is unnecessary in a *Divine*, and not expected from him; whose credit is better supported by those *Qualifications* which represent him as a man of godly *Conversation*, faithful and able
in

in the discharge of his Gospel-Ministry. But that Mr. Glarwill as little understood the subject of a knowledge he pretends unto, it is manifest from hence; that he might easily have denied the Assertion of the Spectacles, that two pair did not impede, but amend the sight in some eyes that are very weak. I know a young Gentlewoman that hath two Cataracts breeding in her eyes, which reads and works with two pair of Spectacles, whereas she cannot with one pair. There is also an old Gentlewoman of my acquaintance who useth the same helps. I am ashamed to debate these fooleries (as our Virtuoso calls them.) but if Mr. Cross did call in question the integrity of the Telescopes, I shall assume the liberty of a digression about that Point, which perhaps may not seem unseasonable in this Age, and which will abate the pride, and evince the great ignorance of Mr. Glarwill.

Either my Memory doth very much deceive me, or else the Lord Bacon did suspect these Telescopes, that they might impose upon our Senses: and I am sure Mr. Boyle is in the same Error with Mr. Cross, for he complains that when He went about to examine those appearances in the Sunne called Macula, and Facula solares, he could not make the least discovery of them in many months, which yet other Observators pretend to see every day: yet doth Mr. Boyle profess, that He neither wanted the conveniency of excellent Telescopes, nor omitted any circumstance requisite to the Enquiry. Besides these, Scipio Claramontius, he that baffled Tycho about the Comets in the judgement of most men, and gained advantages enough against Kepler and Galileo to make himself glorious, and to shew that instead of Mathematical demonstrations they proceeded upon uncertain Topicks and Probabilities: this learned and inquisitive person doth avowedly suspect the Telescopes as fallacious more then once, and that there are more then He of that judgement, is a thing unquestionable by any but Superficial Scholars: nor do I apprehend any other reason then this to be in their

Tentam. Phy-
silog. pag. 144.
155, 156.

Vide Ricciol.
Almag. s. nov.
l. 8. sect. 1. c. 16.

Scipio Claramontius in defensione Anti-Tychonis, & libri de novis stellis à se conscripti Italico idiomate edita, multis contendit Telescopium in representatione objectorum fallax esse, Pars. 2. c. 35. ex quibus inferre c. 16. ei qui vel in apparentibus coelestium per illud excepta ratio haberi, necessario ostendendum esse à nulla abstractionum, quibus illud obnoxium est, hujusmodi vitiorum esse. Quare cum ex una parte assumi nequeat, quod universaliter verum quicquid per Telescopium representatur; ex alia

heads

*partis non potest talis propositio universalis
resolvi in apparenas coelestium, sine
manifesta positione principii, cum hoc ipsum
sit quod controversatur; an fallaci de se in-
strumento observata in coelestibus pro certis
habenda sint? manifestum sequitur nihil ex usu
Tele. opij continui posse de dispositione coe-
lestium. Zuechius Philos. opt. part. 1. c. 17.
sect. p. 175.*

(32)

heads, who have till this day employ-
ed their thoughts here to contrive
new *Glasses*, and amend defects in
the former. Our *Virtuosi* have com-
plained of an *Iris* in their *Glasses*, and
gone about to correct that by *Turn-
ing of them*; but a friend of mine

writes, that he imagines it was after that *Eustachio Divini*
at Rome had given them an *hint* of it: and then they found
it out. A little more modesty in *Assertions* of this kinde
would become our *Wits*, considering that affairs of this na-
ture (it is the opinion of *Archimedes*, and refers to all *Me-
chanismes*) admit not demonstration. Cum neque visus, ne-
que manus, neque instrumenta per quae experiri oportet, satis ha-
beant fidei ad exquisitam demonstrationem. — *Archimed.* in li-
bro de *Arena*.

I shall not so far engage in the controversy, as to repeat
the *Arguments* and *Replies* on both sides. It seems *strange*,
that the *Telescopes* should so magnifie thirty, forty, or one
hundred times *objects on earth*, and yet lessen those of the
fixed Stars in Heaven, viz. *Stellas primae magnitudinis*, *Canic-
ulam*, &c. *Jovem*, *Saturnum* minores representat multo,
quam oculo libero appareant: & idem instrumentum *Stellas*
nusquam apparentes, ut *Jovis Satellites* justae magnitudinis re-
presentat, & paulo minores representat Jove, imo tantas facit,
ut possint plus apparere, quam queant apparere stella prima mag-
nitudinis, — at quid? in *Octava Sphaera* *Stellas* nihil apparentes
magnas facit, *Nebulosas scilicet*, & *Galaxias formatrices*. — This
is granted all by *Galileo* to be true, but he solves by an ima-
ginary *irradiation*, the fancies whereof he advanced upon some
weak *Experiments*, most whereof he deserted himself, and tho
rest are excellently refuted by *Zuechius*, who introduceth
another *Salvo* from the configuration of the *Eye*, and that part
of it called *Uvea*: which perhaps may be discovered to be as
false as any of the other hereafter; but he adds, Ex quo est,
ut in facilitate detrahenda circumfusa sideribus radiationis sit
notabile discrimen inter *Planetas collatos inter se*, & inter *Stellas*
fixas invicem, & aliquas earum cum aliquibus eorum compa-
ratis.

*Scipio Clara-
mont. de uni-
vers. fol 5. c.
221.*

*Vide Scip.
Claram. de u-
niverso fol 9 c.
17. 18. 19. 20
Zuechius Phi-
los. opt. part. 1. c. 17.
sect. 6 p. 171.
lib. 11 p. 216.*

ratas. Thus the Objection in its full force is granted by all (except *Sorſius* deny it) only the cause of the *Phænomenon* was not till *Zucchi* (if then) sufficiently explicated; Sure I am that *he* in another place avows, that long *Telescopes* rightly made do not lessen *Jupiter*, but represent him *greater* than He appears to the *naked Eye*: inſomuch that his *Tube* of 23 feet-long did represent *Jupiter* as big as the *Moon* is when at *full*, and looked upon without any *Telescope*: ſo that He ſays the Objection holds only in *Telescopis brevioribus, in quibus pariter evenit inſpiciendo lucida inferiora*.

Besides, were there ſuch certainty in the *Telescopes*, how comes it to paſs that there is ſuch a *variety of opinions* amongſt thoſe *Observers*, whoſe *diligence* can be as little ſuſpected as their *learning*? *Claramontius* did ſet two perſons to obſerve the *Spots of the Sunne*, (both were inclined to *Novelties*) they were not 40 miles diſtant, yet did not their *Schemes* agree as to *number*, or *ſituation*. Nor is this a ſign of that partial *Peripatetick*: any man that reads *Ricciolus*, and *Zucchi*, will ſee that they cannot agree about the *number*, the *motion*, the *ſituation*, or ſo much as colour of them. The words of this laſt *Writer* are very remarkable in reference to *Mr. Glawill*, and that certainty which *he* aſſerts unto the *Telescopes*, viz. *Neque obſtat diſcrepantia numeri, vel figura macularum in obſervationibus plurium, circa idem tempus captatis: tum quia longiores Telescopii in ampliori diſco plures exhibent, quæ ſpectantem breviori Telescopio, anguſtiori diſco latent: immo eodem Telescopio, ad exactam meſuram ſuae extensionis reducto, notabiles ſiunt aliquæ, ante inobſervatæ: & facillimum eſt in tali meſura minus exercitatos decipere, cum tam pauci ex obſervatoribus, nec niſi monente Scheinero, didicerint ad exacte conſignandam Solis imaginem, & in ea maculas, per trajectionem radiorum Telescopio in planum diſcrete oppoſitum, neceſſariam eſſe mutationem extensionis Tubi, eo notabiliter magis producto in hyeme, correpto in æſtate: Tum quia ſicut facilis eſt, ex allatis, varietas in numero macularum, ita in terminatione, quæ facilius mutari poſteſt ex iſdem capitibus in illis, quæ in pluribus obſervationibus conſignantur, & ex modo conſignandi.* Leſs do they agree

E

about

Zucchi
phil. opt. part.
1. c. 17. ſect. 3.
p. 199, 200.

Ricciol Al-
mag. nov. 1.3.
c. 3.
Zucchi
phil. opt.
part. 1. c. 17.
ſect. 8 p. 233.
See this point
of the variety
of the spots
in the Sun,
particularly
cited by
Schottus in
his Notes up-
on *Kircherus*.
Iter exſta-
cum caſelle. I.
iter 1. dia-
log. p. 182.
and how dif-
ferent the ob-
ſervations of
Gaſſas and
Schottus were
you may ſee
in a Synopſis
in the *Reſa*
Urſina l. 1. c.
1. & id.
c. 10.

about the nature of them: one *Joannes Jarde* named them *Astra Borbonia*: and *Malapertius*, *Massrius*, *Rheita*, do hold them to be *Starrs*: of this opinion was *Scheinerus* once, but he afterwards assented to that of *Galileo*, *Kepler*, *Bullialdus* and *Blancanus*, that they were not *Starrs*, but fuliginous exhalations arising out of the furnace of the Solar Globe, which he conceives to be a fire. *Kircher* and others are of the same judgement; but *Ricciolus* distrusts it, being not able to comprehend how fuliginous vapours should arise in such a number, so constantly, so permanently as to keep a motion about, or with the Sunne, of about 27 days.

Vide Scheiner
tum ubi supra,
p. 184.
Ricciol.
Almag. nov. l.
3. c. 3 p. 7.

Galileo in ep.
ad Vellierum,
citante Caram-
mentio de uni-
vers. l. 9. c. 9.
Ricciolus Al-
mag. nov. l. 7.
sect. 1. c. 2 p.
487, 488.
Scheiner in
Kircher. iter
exilat. c. c. e-
ste p. 301, 302.
Christ. Hugen-
ius apud Bo-
rellum de con-
spiciendis. p. 63

The like uncertainty there is in the Observations about *Saturn*, *Jupiter*, *Mars*, &c. what controversies do they raise and how contradictory are their Relations? *Galileo* doth represent *Saturn* in one figure, *Scheiner* in another: the former saith, that the oblong shape in *Saturn* ariseth from a defect in the Telescope, or Eye, that could not distinguish the *Comites Saturni* from the Planet it self. But *Ricciolus* and others dissent from him in that point: and *Christianus Hugenius* made observations about *Saturn*, such as neither *Antonius de Rheita*, nor *Hevelius* did ever see; and represents the ansula of *Saturn*, differently from what *Fontana* and the *Dantiscan Selenographer* do write. The words of *Hugenius* I shall propose to Mr. *Glanvill's* consideration, *Exspectamus ut sub finem Aprilis, si non antea, brachia Saturni renascantur, non curva illa, cujusmodi a Francisco Fontana, & Hevelio depicta cernuntur, sed secundum lineam rectam utrinque prominentia, siquis melioris notæ perspicillo intueatur. Nam vulgaria si adhibeat binos orbiculos referent, sicuti Galileo primum se obtulere. Nostram quo Saturni affeciam reperimus, quinquagies diametrum rei vise multiplicat, duodenos pedes aquans; cui postea duplum longitudine constrinximus, multiplicatione centupla. Cum autem longiora etiam hisce Telescopia, utpote triginta & quadraginta pedum ab aliis fabricari dicantur, aliquid aut vitri vitii inesse, aut hæc eadem non debita proportionem mutuo respondere credibile est. Neque enim alius hucusque aciem eorum effugisset novus Saturni Satelles.* Being to speak of *Saturn*, I must not forget *Zucchi*, who after

after thirty five years diligent observation with variety of the best Telescopes, represents this Planet differently from what any others write, viz. *Affero Saturnum multorum annorum spatio figura passim oblonga, & in oppositione ad Solem, notabiliter majorem apparuisse, in apparentia medio visum esse album illustre tumidum, aliquo modo ad rotunditatem vergens, accedentibus hinc inde ad illud duabus velut nigris notis, quas alsum illustre, totam apparentiam ad apices terminans ita includit, ut ad apices illius multo sit crassius, ubi vero eas notas complectendo ad medium extenditur, gracilescat.*

Zucchius philosoph. opt. part. 1. c. 17. sect. 5. p. 201.

Affertio est facti, in quo a multis jam, annis conveniunt accuratiores, ex variis Provinciis observatores longioribus Telescopiis instructi.

Scio a prioribus vulgatum, tres a se stellas in loco Saturni spectatas, media multo majori, quae simul mutantes in caelo sitam, a fixis aperte distinguerentur, & Saturni duobus Planetis minoribus stipati apparentiam exhiberent, qui postea, illis a tali situ motis spectatus sit figura rotunda. Verum triginta quinque ut minimum, anni sunt, quibus figura semper oblonga, cum dispositione in assertione assignata, a me spectatus est pluries quotannis, pro vario ad Solem situ, acutioribus, minus acutis, cavis, convexisque lentibus ad oculum proxime in Telescopio adhibitis apparentia eadem, semper magis distincta, & majori, in oppositione ad Solem, etiamsi meliorem vitiorum elaborationem in multis longioribus Telescopiis postremo D. D. Evangelistae Torricellii, & Eustachii Divini artificio, & beneficio singulari consecutus sim. — Quare in hoc priorum observationes, qui brevioribus, minusque perfectis Telescopiis, ut omnino ratas admittere non audeo.

Concerning Jupiter, and his Satellites, and their number, taking in the Urban Octavian Starrs, I finde a great variety, even when two men observed at the same time, as de Rheita and Gassendus: that both of them were in the right, cannot be said: which of them were in the wrong, I know not. In summe, the observations about Jupiter and his Attendants are so various, *Aliter enim apparuerunt Simoni Mario, aliter Appelli, aliter Galilaeo, that Claromontius takes this advantage of it. Ego igitur argumentum ex ejusmodi diversitate alicio*

Vide Schottum in Kirch. iter exstaticum coeleste p. 268, 269 &c. Riccioli in Almag. nov. l. 7. sect. 1. p. 486.

S. ipio Cla:
ramenti: 1. 4.
universi: 1. 9
c. 8.

contra veritatem objecti, non contra observationum diligentiam, cum observatio ejusmodi: non sit nisi pura per tubum transpositio, eaque defixa: is etiam viri perfectum instrumentum habebant, esque id verisimile, cum in eam rem toti incumberent, instrumentum etiam exactum paravisse: oculorum etiam & visus acumen, cur deam apelli & ejus in observando socii, potius Galilæo de merem, qui se fateatur oculum minus perfectum habere.

Scotus in
Kir. ber. iter
exitar. c. 11.
p. 142 &c.
Ricciolus Al-
mag. nov. 1. 7.
sect. 1. p. 486.
Zucchi-
phil. opt. part.
1. c. 17. sect. 4.
p. 193.

Neither are they better agreed about Mars and his Figure, the umbo or spot in him. Gassendus denies that ever he saw it, though he used the Tube of Galilæo; others avow it: as you may see in Schottus and Ricciolus. In fine, as to the new Phenomena about Mars, Venus, and Mercury, to defend them Zucchi is forced to complain of the Telescopes, and protests thus. Interim te, amice Lector, provoco Spectatorem, bono & longiore Telescopio instructum, cujus Lens superior ad obtinendam figuram apparentiarum bene precisam, juxta dicta, maxima ex parte contestata sit, modico ad medium aperto foramine.

Berigardus
Circul. P. 1. 2.
de Luna. id. b

I am tired with the further prosecution of this Subject; and therefore shall confine the rest of my discourse to the Observations about the Moon: the contemplation whereof, as it is more facile, so it hath been more pursued then any other of that kinde. There is none of our Comickall Wits doubt that it is a World, divided into Hills, Valleys, Seas, Lakes, Rivers, and even peopled as this Terrestrial Globe of ours. But it is remarkable, that the use of the Telescope hath not convinced some, that the Moon hath an unequal surface, but that the Phenomena of the spots may be solved by the conceit that some parts of it are more Diaphanous, some more opaque. Who hath not heard how Scheiner looked on the Moon in an Eclipse, and did conceive it was fistulous, (at least translucent in part) and so did transmit the light thorough several Cavities in some places, whilst others, not directly subject to the Sunne, are obscure. They cannot agree whether the Spots of the Moon be more bright, or obscure in an Eclipse. The observations and descriptions of the Moon, made by Galilæo, Scheiner, Fontana, Schottus upon Kircher,

&c.

Uc. are so defective, that we must repute them but as the first rudiments of an intended Science. And as for the descriptions of the Phases of the Moon, made by Langrenus and Hevelius, however there be many things in which they all agree: yet the Telescopes of Ricciolus (made by a Bavarian Artist) and of Franciscus Maria Grimaldi either rectified the mistakes, or represented many Phenomena different from those delineated by Galileo, Fontana, Torricellius, and Manzini, viz. *Lunari faciei partes omnes magnas, mediocres, ac minimas singillatim Telescopio intuens Grimaldus, easque statim cum Langreni & Hevelii Schematibus comparans, deprehendit multa quidem egregie ab iis peracta, non pauca tamen superesse, quae aut addenda, aut quoad situm, magnitudinem, figuram, symmetriam, nigroris aut claritatis differentiam corrigenda forent.* Such as reject the exact Sphericalness of the Moon, introduce Asperities and inequalities in the surface of it, which some explain by Mountains, Valleys, and Waters: but concerning the parts of the Moon, which might be Water, and which Land, our Observators did differ. Galileo believes the spots or obscure parts to be water. Kepler held the contrary, that the bright parts were water, and pretends to demonstrate it out of Opticks. though afterwards he changed his opinion for that of Galileo's, which is generally received. As to those asperities in the surface of the Moon, whether they extend to the Limbus, or utmost circumference, or no, is a doubt amongst them: Galileo denies it; Kepler, Ricciolus, and others affirming it: and the latter gives this reason why they are less frequently observed there: *Vera causa cur raro asperitas illa Limborum videatur, est partim imperfectio Telescopii, &c.* Neither are they better satisfied about the Atmosphere of the Moon: that there is one, Galileo, Kepler, Antonius Maria de Rheita, Kircher, Gysatus, Scheiner, with others do avow: and Langrenus saith, that we may observe it with a Telescope: *eandem Tubo specillu conspicui affirmat Michael Florentius Langrenus.* But others deny it as peremptorily.

Interim

Ricciolus Al-
mag. nov. l. 4.
c. 7.

Galileo sy-
stem. cosmic.
p. 131. cult.
London.
Kepler. Astro-
nom. Optic. c.
6. sect. 9.

Ricciolus Al-
mag. nov. l. 4.
c. 8. qu. 2.

Kircher. iter
extat. cœ. ult.
p. 48.

Ricciolus Al-
mag. nov. l. 4.
c. 6. sect. 8.

Ricciolus Al-
mag. nov. l. 4.
c. 2. sect. 1.

Zucchius phil.
opt. part. 1.
c. 17. sect. 9. p.
264.

Interim mihi (saith Ricciolus) nondum quocunque Telescopio adhibito aer hic ita patuit, ut illum potius prope ac circa Lunam, quam in aere nostro, in quo & Halones sunt, cogar agnoscere. And Zucchius at large proveth this Corollary, *Non eleventur vis luminis Solis vapores e Luna, sicut eleventur ex Globo e terra & aqua integrato: Neque datur circa Lunam Sphæra vaporosa ulla, qualis circa dictum Globum deprehenditur.*

Having proceeded thus far, I shall take notice of some extravagant opinions that possess many of our Comical wits, and their Associates or Admirers, which are extended to the prejudice of Christianity, and the growth of Atheism in this Age, viz. That the resemblance betwixt the Moon and the Earth is such, that it is a *Terraqueous Globe* inhabited by men, and they hereupon concern themselves about their Progeny, Salvation, &c. I shall from hence take occasion to instruct those phantastical persons, that even *Hevelius*, who accommodated the *Terrestrial Geography* to the *Lunar Globe*, and seems to conclude that the illuminated part is earth, the darker is water: yet did it only because He knew no fitter comparison amongst sublunary bodies. — *Non est autem quod quispiam ideo existimet Lunam ex ejusmodi sabulo, luto, aut lapide esse compositam, ut hac terra nostra, siquidem fortassis ex alia poterit constare materia, ab imaginatione nostra prorsus diversa, & modo adhuc incomprehensibili.* — *Minime etiam hasce Lunares aquas nostris similes assero, sed quod nihil quicquam similis, propter magnam utrarumque affinitatem hic in terra habeamus, cum quo illas comparare valeamus.* It was indiscreetly done of *Kepler*, *Kircher*, *Hevelius*, and such Writers to carry on the comparison so far, the resemblance betwixt the two Globes being so little as the most unprejudic'd persons find it to be. *Hevelius* perinde ac si Luna esset altera tellus, *Geographica* nostratis *Telluris* nomina in Lunam transtulit: licet quoad figuram, situm, symmetriam, &c. nulla fere sit Analogia inter utriusque superficiem. The truth whereof will further appear from those considerations which the inquisitive *Zucchius* after thirty five years use of all manner of Telescopes at length fixed upon, viz. *That the discrepancy of Parts in the illuminated Moon may be explained with-*

Joan. Heve-
lius Seleno-
graph. p. 148.

Ricciolus Al-
mag. nov. l. 4. c.
7. p. 103.

Zucchius phil.
opt. part. 2. c.
17. sect. 9. co-
rol. 7. p. 266.

out attributing thereunto any variety of colours: yea, it ought to be so explained. The first part of which Assertion he proves thus: because in *Opac bodies* the difference of a greater and lesser *Obliquity* in their situation towards the body that shines upon them doth cause a diverse manner of illustration. Thus the same wall, of one uniform colour, according as it is differently illuminated, seems in some parts to be *white*, in others *pale*; in others *dark-coloured*, and *black*: besides that, a greater or lesser *asperity* or inequality of the superficies may cause an intermixture of the *enlightened* and *over-shadowed* parts, and so create different appearances of *light* and *opacity* in their most observable parts.

The second part He proves thus: because that the face of the Moon being looked on with a *Tube* of an extraordinary length, with *Glasses excellently polished* (such as He used for many years) appears *all of it* like a great Tract of Land covered over with *Snow*, which the *Sunne* variously illuminates accordingly as the parts are differently framed and situated. Where there is any change of situation in the parts illuminated in reference to the body that irradiates them, then do such parts *abate of their whiteness*: and although they still continue in such a position that his beams may in some degree and manner reach them, yet by reason of the *unequal surface* of the *Moon* (in which some parts are more elevated then others) some parts are *directly opposite* to the *Sunne*, others are glanced upon with an *oblique ray*, and this mixture of *shades* and *brightness* occasions those spots which we so talk of. Thus upon the *libration* of the body of *Jupiter*, the *girdle*, which otherwise seems remarkably black above the other adjacent parts of the Planet, becomes like unto the rest of the body in *whiteness*, and so disappears.

As to the distinction of the Moon into *Sea* and *Land*, consisting of *Mountains* and *Valleys*; although the *Analogy* may seem allowable by reason of the *Asperities* in the surface of the *Moon*, (which is a thing not to be denied: albeit that the calculation of the *height* of those more elevated parts are ridiculous, except the nature of the *Cavities* were better

Existimo materiam globi lunaris non constare terra & aqua Galilei system. conf. mic p. 132.

Zucchi-
phil. opt. part.
1. c. 17. sect. 9
p. 260, 261.

Zucchi-
ubi supra p.
263.

Galileo pro-
bably, that in
the Moon there
is no rain; no
clouds there
thicken the
air. Longis ac
diligentibus
observationi-
bus nunquam
ad animad-
vertere potui,
ac semper u-
niformem pu-
rissimamque
serenitatem
ibi deprehen-
di. Galileo.
system coi-
mic. p. 133.
Zucchi-
ubi supra p. 264.

to be discovered, as *Zucchi-
us* shews) yet the imagination
of *Seas* and *Lakes* therein, or any thing of that *Na-
ture*, except what borders upon the *Peninsula delirio-
rum* in the *Lunar Chart* of *Ricciolus*, 'tis all an improbable
phantasy. For, that the *more pale* and obscure *spots* are not
water, appears hence, that those *spots* keep the same *Phasis*
or appearance for many days, though the *Site* of the *Moon*,
both in respect of the *Sunne*, and of us the *Spectators*, do
vary much in that time: whereas when the *Sunne* casts his
beams upon *Seas* or *great waters* on *Earth*, the *Phanomena*
differ according as the *Sunne*, or the beholder vary their *sta-
tion*: And this alone might convince us, but that I finde
now in *Zucchi-
us*, viz *Similiter transitum successivum radiis So-
lis ad fundum usque ad magnis maculis intra margines illustri-
ores contentis præbent* (ut diximus in *apparentiis*, pag. 239.)
*quod non evenit in liquido profundo instar aquæ, ut in aquis ex-
perimentur etiam in multa vicinitate illustratis, quando notabilem
habent profunditatem: tum quia constantem inæqualitatem illu-
strationis exhibent in horizonte Lunari, & quidem, juxta dicta
in Apparentiis (num. 3.) secundum magnam extensionem illu-
stratam, intra reliquas partes nondum Solis radiis perfusas; imo
aliquæ, Soli proximiores, alias sequentes in eadem majori ma-
cula inumbrabant: hujusmodi autem convenire non possunt cor-
pori inconsistenti, & liquido aquam referenti, quæ tamen cer-
tum est convenire aliquibus Luna partibus, ab omnibus inter ma-
culas computatis.* I must confess I think these *reasons* con-
vincing to any persons not prepossessed; and they are
much more inforced by him with a *discourse* concerning *ex-
halations* and an *Atmosphæar* about the *Moon*, which he de-
nies *absolutely*: yet considering the proportion of the *ima-
ginary Waters* to the *Land* in the *Moon*, and the *heat* and *con-
tinuance* of the *Sunne-beams* thereupon, common reason
would tell us, that the *vaporous exhalations* would *propor-
tionably* exceed those about the *Earth* here, and produce
an *Atmosphæar* that should be *observable*, whereas the most
accurate inspection at most opportune times with the best
Telescopes could not satisfy *Zucchi-
us*, that there was any
such thing at all.

Kepler

Kepler (and his Master Mœstlinus) did believe that the Moon was a World consisting of Sea and Land, making up one entire Globe, as the Earth does; and that the Mountains there were much higher and bigger comparatively then those of the Earth: and adds by way of jocundry, that since the Men and other Animals commonly participate of the nature of the soyl and climate they dwell in, that the inhabitants of the Moon must be of a greater stature, and more robust constitution then those of the Earth: The Day there making up fifteen days of ours: and the Heats seem so scorching, and so unexpressible by reason of the Suns being vertical to them so long. In fine, he thinks it no absurd opinion of the Gentiles, that made the Moon a kinde of Purgatory for departed Souls.

Upon the most serious consideration of all circumstances, whereunto I could ever engage my thoughts; when I reflected upon the great difference betwixt the Days here and there; the different influence which the Sunne must have here and there through the Diversity of his Aspects, (whereupon depend Terrestrial productions) that there is no rain, no clouds there; no Atmosphere (like ours) proportioned to such respiration and life: no intermixture of earth and water: no innate diversity of colours, which occasion the Phenomena that perplex our over-curious Mortals: and that all the Enquiries hitherto made, have so little of evidence, that 'tis more clear that the

Kepler's Astro-
nom Optric,
c. 6. Sect. 7.

Galileo System. Cosmic, p. 132. Existimo materiam Globi Lunaris non constare terra & aqua. Quæ res una ad generationes alterationesque nostris similes tollendas sufficit. Verum tamen etiam si concederetur Aquam ibi Terramque dari; non tamen plantæ & animalia nostris similia nascerentur, idque ad duas præcipue rationes: primo quia ad nostras generationes aspectuum Solis varietas adeo necessaria est, ut sine illis esse nullis possint. Jam autem habitudines Solis ad Terram, ab illis quæ sunt ad Lunam, valde differunt. Nos quoad illuminationem diurnam, in majori parte terræ, singulis horarum viginti quatuor periodis, nostris atque diei vicissitudinem experimur, quæ in Luna menſu demum spatio absolvitur. Item ille Solis in Zodiaco descensus & ascensus annuus, qui hiemis astutisque vicissitudinem & dierum ac noctium inæqualitatem producit, in Luna unico menſe finitur: Cumque Sol apud nos sic elevetur ac deprimat, ut inter maximam ac minimam altitudinem intercedat differentia gradum, 47. quanta nimirum est distantia ab uno tropico ad alterum; in Luna non nisi 10 gradibus aut paulo amplius illa differentia constat. Quanta scilicet est maxima latitudo Draconis ultra circulum Eclipticam. Nunc consideretur qualis operatio sit futura Solis in Zona torrida, si per quindecim dies continuos radiis suis eam ferire pergeret. Per se enim intelligitur, omnes plantas, herbas & animalia perire. Quod si vel maxime generationes illi fierent, illa tamen ab herbis, plantis, & animalibus nostris ut diversissima forent.

Secundo posui assiduum est mihi, nullas in Luna pluvias esse. Nam si qua parte nubes ibi congregentur, ut sit in terra, viderem usque ad illarum aliquid abscondi, quæ ope telescopii in Luna conspicimus: & in summa, in particula aliqua nobis variaretur aspectus. Id quod longis ac diligentibus observationibus nunquam animadvertere potui, ac semper uniformem purissimamque serenitatem illi deprehendi.

Moon is a Cheese, (not fat, for then it would melt) odly figured and made with Asperities in its superficies and perhaps a little rinyed in some parts then an Earth resembling ours: I could not but condemn those our Comical and Atheistical Wits, who use so little of modesty or scrupulousness in their discourses about this so uncertain subject They are men of so little reading and inquisitiveness (whatever they pretend unto; as if this Nation produced no persons equal to them for Learning and Abilities, that they never examined these debates; but the opinions which they take up and transform into Assertions, are only the raillery or casual and imperfect pieces of conversation betwixt more intelligent persons, or some Coffee house talk, which they confidently obtrude and impose upon speculative or more considerate Gentlemen, and render themselves insupportable in any Society.

A young Gentleman, a friend of mine, who was not a little valued in the world, who was no stranger to the *Mathematics*, and whose wit and learning far transcended any thing I can observe in a droll and Comediantes of these times, entertain'd me with a discourse once of this nature; Having spoken of the *Celestial Phenomena*, how differently they were represented by sundry men, he was more prone to suspect their *dioptrick Tubes*, then their integrity: He thought our Eyes were *Telescopes* of God Almighty's making, and the model by which the others were regulated and amended: and that any man who regarded the daily Occurrents in vision, could never believe it possible, that any certainly could be derived from *Telescopes*, about such *Phenomena* as we could employ only one sense about, and that not in a due distance, and with such circumstances as legitimate the judgement thereof: That we were to look through their different mediums (granting that our Air makes but one *Diaphanum*) and those not contrived dioptrically, that we know, and that since every medium, thicker or thinner, (besides the intercurrenties of irregular and unknown particles, like to moats in and upon a Glass) did cause a different *Refraction*, and that neither the constitution of our Atmosphere (as not proportionate to our sensible enquiries) and air, nor the intermundial *Aether*,

nor

Tam lentius
lucis duabus
constans dici
potest oculus
mere ut ip-
si jam Schol-
lici Rol. U-
l. 2. c. 7
quem vide ib.
a C. 12. u. que
ad C. 30.

Tam raritas
quam densitas
potest esse cau-
sa refractionis.
M. M. M.

Gallies sy-
stem celestie.
p. 77.

ned the *Grandeur of Rome* to be like unto his *Village*, or the *Scot* who represented *London* to be such another town as *Edinburgh*. It is an opinion wherein the *Peripateticks* and *Lyncei* are agreed: *Quicquid sub nostram cadit imaginationem, id aut jam ante viderimus oportet, aut ex rebus rerumve partibus jam ante visis compositum sit, quales sunt Sphinges, Sirenes, Chimera, Centauri, &c.* He smiled at those who thought they had much improved *solid knowledge*, by telling men of *Quasi-terra*, *Quasi-mare*, *Quasi-sylva*, which he supposed to be as insignificant termes as the *Canting* of *Chymists*, or the *Quasi-corpus*, and *Quasi-sanguis*, in the gods of *Epicurus*: that it was intolerable in a *Philosopher* to phrase it thus, however a *Poet* might say,

Ἰχθῆρ, οἷός περ τε βῆσι μακάρεσσιν θεοῖσι

But nothing created in him a greater *laughter*, then the *Proposals* some made of *flying to the World in the Moon*: this design he thought *superlatively* ridiculous, though the contrivance of *wings* for *mankind* were then but projecting at *Wadham-Colledge*: It did not appear to him then that *this World* was no *Magnet*: he wished that first these *Opiniatours* would go to both *Poles*, and placing themselves there try the *Observations* of *Des-Cartes* with some dust of *Iron*: that they would consider whether the more *remote Air* would bear up their *wings* and *weight*, (perhaps there might be that difference in *Air* that there is in *water*, where those *Ships* which sail in *salt-water* do sink in *fresh streams*) and how it might agree with their *respiration*, since the *Air* upon the tops of *Andes* of *Peru* is so sharp, that those *Mountains* are as difficult to pass, or live upon, as *Aristotle* represents *Olympus* to have been, where men are forced to breath through *Sponges*: whether that *inhability* of the *Air* for men to breath in it did arise from the *real nature* of so *elevated* a place, or that it was occasioned by some *destructive exhalations* (since *Mount Athos* is reputed higher then *Olympus*) he knew not: but he thought they might enquire well into this particular, and into those regions (which are different) wherein *storms*,
thunder,

Vide P. Alph.
Ovagium in
relatione Chi-
densi c. 3.
Regiol Al-
mag nov. in
append. ad
part. primam
tomi primi,
p. 730.

thunder, and snow are generated; what tempests might arise therein (of which we are not sensible here below) what provision there is against them before one arrives at the twelve Celestial houses: what accommodation of meat and drink, what money currant in those parts, all which ought to be regarded lest our Experimentators should come off as ill as the Knight of ~~Mancha~~ Mancha did, when he had not wherewithal to defray the expence of his *Inne*: besides that, he was much afraid, that at their arrival, agreeably to what Kepler saith, they might finde their lodging too hot for them.

Having said these things, that great young man, (who died before that Ignorance and the *Virtuosi* grew prevalent) presented me with the works of Marcus Aurelius Antoninus, published by D. Meric Casaubon, opening it at that place where that understanding Emperour acknowledgeth it to have been the special favour of the Gods, that he never troubled himself about these Meteorologies and extravagant speculations, whereunto nothing humane can reach: He added, that in these kind of speculations he knew enough that was secured from superstition, that for a man to desert those Studies which qualify him for a sociable life, and were of importance to the preservation of the Government and Countrey he lived in, this was a kinde of *salvagenesse*, had more of the Anchorite, then of Civil Prudence, and was to be encouraged in a Cloyster, or in the deserts of Thebais, then to be made a practice among wise Statesmen.

I have sometimes entertained my self with the remembrance of this Gentleman, and guessed how he would have sported vt that passage of Mr. Glanvill, in his *Scepſis Scientifica*, where he complements the R. Society, to whom that book is Addressed.

We expect greater things from Neoterick Encouragers. The Cartesian Philosophy in this regard hath shewn the World the way to be happy. And methinks this Age seems resolved to bequeath Posterity somewhat to remember it. The glorious Undertakers

Concerning a voyage to the World of the Moon, the difficulties of the passage and of the air, water, and other circumstances there, read Kircher his *Iter exstat.* unto the Moon; and you will find how just a caveat I give here.

Scepſis Scientifica. p. 133, 134

kers, wherewith Heaven hath blest our days, will leave the *World* better provided than *they* found it. And whereas in former times *such* generous free-spirited *Worthies* were as the *Rare* newly-observed *Stars*, a single one the wonder of an *Age*: In ours *they* are like the *Lights* of the greater size, that twinkle in the *Starry Firmament*: And this last *Century* can glory in numerous *Constellations*. Should *those Heroes* go on as they have happily begun, they ll fill the *World* with *Wonders*. And I doubt not but *Posterity* will find many things, that are now but *Rumours*, verified into (*a*) *practical Realities*. It may be some *Ages* hence; a Voyage to the (*b*) *Southern* unknown *Tracts*, yea, possible the *Moon*, will not be more strange then one to (*c*) *America*. To them that come after us, it may be as ordinarie to buy a *payr* of *Wings* to flie into *Remotest Regions*; (*d*) as now a pair of *Boots* to ride a *Journey*. And to conferre at the distance of the *Indies* by *Sympathetick* conveyances, may be as usual to future times, as to us in a *literary correspondence*. The restoration of *Gray hairs* to *Juvenility*, and renewing the *exhausted marrow*, may at length be effected without a *Miracle*. And the turning the now comparative *desert World* into a *Paradise*, may not improbable be expected from late *Agriculture*.

Now those that judge by the narrowness of former *Principles* and *Successes*, will smile at these (*e*) *Paradoxical Expectations*: But questionless, those great *inventions*, which have in these *latter Ages* altered the face

a God forbid.

b 'Tis very cold going thither, if you believe Sir *F. Drake*; as I have shewed afore in my discourse of the *North-west passage*.

c Yes a little more; the *Ancients* had been there before; besides, the difficulties ingoing to the *Moon* are more insuperable.

d *Pacoler's* *Holle*; *Fortunatus's* *wishing-Cap*; the skill of *Medea* in restoring *youth*, all ancient and modern fables shall be really achieved!

e They that do not so, laugh at you, and think such expectations the *paradoxical*.

face of all things, in their naked *Proposals*, and meer *Suppositions*, (f) were to former times as *ridiculous*. To have talked of a *New Earth* to have been *discovered*, had been a (g) *Romance* to *Antiquity*: And to sail without sight of *Stars* or *Shoars* by the guidance of a *Mineral*, a storie more absurd then the flight of *Dædalus*. That men should *speak* after their *tongues* were *ashes*, or communicate with each other in *differing Hemi spheres*, before the invention of *Letters*, could not but have been thought a *Fiction*. *Antiquity* would not have believed the almost incredible force of our (h) *Canons*; and would as coldlie have entertained the wonders of the *Telescope*. In these we all condemn (i) *antique incredulity*, and 'tis likelie *Posterity* will have as much cause to pity ours. But yet notwithstanding this *streightnesse* of shallow *Observers*, there are a set of (k) enlarged Souls that are more *judiciously credulous*, and those who are acquainted with the *secunditie* of (l) *Carte'sian Principles*, and the diligent and ingenious *Endeavours* of so many true *Philosophers*, will despair of (m) *nothing*.

This is a most *extraordinary Flourish*: Yet I finde the *Rhetorick* defective in the suiting of the *Antitheses* and *Anastrophe*s: but I shall not take notice of that fault now, it is so general in our *Comical Wits*. I shall now quit my *Digression*, and resume the controverſie betwixt the two *Disputants*. Mr. *Glanvill*, for the credit of those *Dioptrick Glasses*, told Mr. *Cress*, "That he might try them upon Objects near, and easily visible, by the unassisted sight; and if he made trial, he would finde they altered the Objects in nothing but their proportions, which are represented larger for the ad-

f Prove that they ever did think of them: if they did not, they could not be ridiculous to them.

g Enquire into the Navigations of Antiquity and then say thus.

h The strangeness is more in the incredible force of the powder: had they known that, they would not have thought the other strange: I know not any that conclude as the ancients I: in credulity about such matters as were never proposed unto them, but for the credulity of this Age, expect scorn rather than pity.

k 'Tis a pretty philosophy indeed, it is all invention.

l Not of the Paracelsa, nor of the philosophers stone, nor any thing in Ovids Metamorphosis, Atlantis, or Utopia.

m Los ultra,

"*vantage of vision in things small and remote; and we have all*
 "the like reasons to distrust our Eyes, as these Glasses (for
 "their informations are the same in all things, but the men-
 "tioned difference) and there is no man such a fool as not to
 "make allowance for that. — I see Mr. Glanvill is not on-
 ly ignorant of the *Opticks*, but altogether unacquainted
 with *Telescopes*: for first there are some made by Mr. Smith-

Duobus vitis convexis instructo Tele-
 scopio, habetur simul & semel objecti medi-
 occis, vel multarum partium grandioris re-
 presentatio, sed inversa: si debite adda-
 tur tertium convexum, multiplicatis adhuc
 refractionibus, una unius obtinetur ap-
 parentia, & in situ conformis Objecto. *Zuc-
 chius phil. opt. part. 1. c. 17. sect. 2. p. 180.*

*Zucchi-
 us ubi
 supra p. 181.*

Expansionem repræsentativorum æqui-
 valere remissioni, & densationem eorum
 intensiori, & utramque non à medio, sed
 à propria conditione propagationis radio-
 rum pendere, id ibi. Si Telescopium sit
 extraordinariæ longitudinis, ex nimia ex-
 pansione, quæ æquivalat remissioni quali-
 tatis visibilis, appareat nimis ditum: ut
 minus in eo varietas partium inter nosci pos-
 sit. *Zucchi-
 us phil. opt. p. 2. tit. 3. c. 7. sect. 3.
 p. 366.*

*Zucchi-
 us phil. opt. part. 1. c. 17. sect. 6 p. 204*

wick (a very ingenious and worthy man) which represent the *Phases* of the *Moon* very well, and yet invert all *Ob-
 jects*, but that is no default or impediment where the thing looked on is
 round. These convex *Telescopes* alter the *Object* in some thing else besides
 their proportions: nor doth any such thing happen in a well-
 disposed Eye upon vision. Secondly, he might have known
 this further difference betwixt an un-assisted sight, and what is
 performed by the best and longest *Telescopes* about ordinary
Objects, that the *Dioptrick Tubes* do represent the light and
 colours of bodies more dilute and remiss then they appear to
 the naked Eye. Per *Telescopia*, præsertim longiora, objecta
 spectantur luce & colore dilutiora, quam libero oculo. This is
 granted by *Zucchi-
 us* and others; and the reason is given by
*Zucchi-
 us*, because that so great an expansion or amplification
 of the *Object*, and distancing of its
 parts one from the other, is equivalent
 to a remission of those qualities therein.
 But to shew Mr. Glanvill a little more
 of his ignorance in *Telescopes*, I shall
 shew him some further differences be-
 twixt the naked sight, and what is per-
 formed by those Glasses. For some of
 them represent some *Objects* greater
 then they appear to the naked eye:
 Some (in the shorter Tubes) are represented no bigger, or ra-
 ther less then they otherwise seem: Some *Objects* in the
 longer *Telescopes* are magnified indeed, but nothing so much as
 other *Objects* are by the same Glasses. The Experi-
 ments

ments are obvious: place a *candle* in the dark at some considerable distance, and the flame will appear round and encompassed with rays: then take a short *Telescope* fitly made and placed, and look through it, and you will see the irradiation taken off, and the flame represented as oblong, not round, and rather seemingly less then greater then it appeared before to the naked Eye. Then turn your eye unto any coloured Object, and take notice how big it seems: assume the same *Telescope*, and you shall find that to be magnified above what it seemed to the naked eye by much. After this, take a long *Telescope*, and view the aforesaid candle through that; and at the same distance view some other coloured Object, and you shall see that this last *Telescope* will represent both Objects much magnified; but the Candle less of the two by far.

But I shall adde further, that it is not to be doubted but that the *Telescopes* of *Galilao*, *Scheiner*, *Rheita*, *Gassendus*, *Grimaldi*, *Eustachio Divini*, *Hévelius*, *Hugenius*, *Ricciolus*, and *Zucchi*, were good in their kind, and that they did represent Objects as truly here on earth, as any could; yet when they come to be applied to the *Celestial Phenomena*, what difference is there in their *Observations*? How do they complain either of the default of the *Telescopes*, or want of care or skill, each in the other? *Simon Marius* boasts

of his accurateness: *Scheiner* in his *Apelles* tells us, *Observationes omnes facta sunt summo studio cœlo serenissimo, semper cum observatum est, & obscurissimo, plerumque in absentia videlicet Luna: talis vero variis & excellentissimis, quorum uno meliorem adhuc ad stellas non vidi.* But enough may be collected to this purpose out of the foregoing discourse, so that I need not repeat it over again: out of all which as I would not be understood totally to discredit the use of *Telescopes* in celestial discoveries, (I do not

Si Lunares discos, post tot inspectores, & inspectiones, p̄blicos videat, neque numero, neque conformatione sibi correspondent: quom multa partes vel p̄a aliis circumpositis illustiores interjeda & sua multis minoꝝ illustrationis extinctione illu interrumpentes, aliquos latuerunt, & in angustissimis, vel minus accuratè expressis. Discis omnia, q̄a verè internoscibiles sunt in luna, & ab aliis consignantur? quantum totius Disci lunari terni notis. & insignium in ea partium, variata? Zucchi phil. opt. part. 1. c. 17. sect. 8. p. 213.

*Vide Scitum.
Claramont.
de Univers.
l. 1. c. 8.*

deny but *some things* and *some motions* are observed by them, which a *naked Eye* cannot discern; but this *knowledge* arrives to a slender degree of *certainity*, when the *Phænomena* come to be particularly explicated; and *theoremes* or *assertions* framed thence) so I would not have them too much relied on, nor men be too confident in *principles* and *Conclusions* which have no *surer Foundation* then those *probabilities*: and I do herein joyn with *Claramontius* in that *Epiphonema*, *In tanta diversitate, quid certi ex tubo Optico habemus?* If I must suspect the skill or accurateness of *Galilao*, *Scheiner*, *Gassendus*, *Hervelius*, *Fontana*, *Ricciolus*, and *Zucchi*, and such like; pardon me, if I know not *whom* to believe.

I have been the more large in this Point because of the insolence with which *Mr. Glanvill* persecutes that *Reverend*, and otherwife learned person, whom he represents to the world as *He* pleaseth, and accordingly treats him with that contempt and scorn which is less allowable towards a *Divine*, and such a one as is, and always hath been in that Countrey very much esteemed by several *honourable Families*, as well as others. However God hath so providentially ordered the dispute, thereby to check the pride of our *Virtuoso*, that *The Man of Words* cannot triumph over the *Man of Axiomes*. And if it be true, that our *Aristotelean* was amazed at the hard words of *Dioptrick Tubes*, &c. as if there had been *Magick* in them: I doubt not to justify Him in it; for the insolent *Virtuoso* made use of them, not as became a *knowing person*, but as *Conjurers* use *strange termes*, and of an *uncouth sound*; though perhaps really *Hebrew*, *Latine*, or *Arabique*.

Besides all this, perhaps *Mr. Cross* seems to have been offended at something in that mixt discourse or dispute, that might derogate from the *Authority of the Scripture*: many sayings are not *innocent*, but as they are worded or uttered. To say the *Scripture* was written to mens fancies is an expression very unwary in a *Divine*: although a convenient interpretation may excuse it. To say it is not written according to vulgar *Methods* may so be spoken, that the action may render the words culpable. And in another Age they might have

have passed better then now, when men are prone to vilifie the Scripture, especially the little Wiss. I perceive Mr. Sprat is not over-tender of the dignity of the Scripture: for although there be an ancient Canon of the Church against the applying the Sacred Word of God ad scurrilia & adulatoria (which Canon is authorised even by the Council of Trent) yet doth he encourage men to apply it to ordinary Raillery. "The Wit that may be borrowed from the Bible is magnificent, and as all the other Treasures of knowledge it contains, inexhaustible. This may be used and allowed without any danger of prophaneesse. The Ancient Heathens did the same. They made their Divine Ceremonies, the chief subjects of their phantasies: by that means their Religions had a more awful impression, became more popular, and lasted longer in force then else they would have done, And why may not Christianity admit the same thing, if it be practised with Sobriety and Reverence. What irreligion can there be in applying some Scripture-expressions to Natural things? Why are not the one rather exalted and purified, then the other defiled by such Applications? — The Case is clear Gentlemen, Hath not the Lord said, What hast thou to do to take my words into thy mouth since thou hatest to be reformed? Besides, methinks our Divine might have remembered the feast of Belshazzar, and the resentment that the Lord expressed upon the applying of the consecrated vessels to the serving in a festival banquet, though to a Prince. He might have called to minde the hand-writing upon the wall, and very probably have inferred with himself, that if God was so concerned at the misapplication and abuse of those Temple-Vessels, he would much more severely interests himself where that Word of his, which he hath so many ways hallowed and recommended to our Veneration, is abused to raillery: This Humour is no part of the words or works in which the Man of God is to be perfected by reading of the Holy Scripture. I fear the great Judge will one day say unto these Drolls, Ye are weighed in the ballance, and found too light. To conclude, the generality of Raillery amounts to no more but so many idle words, and they become doubly criminal by being profane.

Plus ultra
Page 414.

But this practice of theirs was the ruine of their Religion, as any man may judge who sees what use Clements Alexandrinus and Lactantius make of it against Paganism. And the Greeks thought so when they punished one, *ὁ μὴ ἔχων τὸν ἑσπερινόν*.

Of the Antiquity and Use of Chymical Physique.

Plus ultra,
Page C. II.

"**C**Hyminstry hath indeed a pretence of the great *Hermes* for its Author, (how truly I will not dispute.) From him 'tis said to have come to the *Egyptians*, and from them to the *Arabians*; Among these it was infinitely mingled with vanity and superstitious devices: but it doth not appear at all in use with *Aristotle* and his *Sectators*: Nor doth it appear that the *Grecians*, or the disputing Ages, were conversant in these useful and luciferous Processes.——

Our *Virtuoso* is not willing to dispute whether *Hermes* were the Author of Chymistry, or not: It had become one that is encharged with the Cure of Souls very well, to have declined all these other disputes, as being remote from those Studies, by which he ought to qualify himself for a befitting discharge of the Ministry. But to tell him further, what I am sure he is ignorant of, the *Egyptians* did never attribute to *Hermes* the Invention of Physick, or any part of it, but to *Apis* and *Æsculapius*; and as for that Chymistry which they practised, which consisted in melting down and

Chimix nomine olim haud legas quid aliud significatum, quam χρυσουμιντλην, cui vero μεταλλουργικην, namque vi-
horum metallorum lapidumque in me-
lius commutationem pollicetur Ne qui-
dem l-gere est. vel medicamentis prepa-
randis operam aliquam impendisse pri-
mos Chimix professores. CONRING. de
Med. Herm. c. 3. p. 15.

improving of *Metalls*, or making of *Gold*: the *Egyptians* did never reckon the discovery of that Art amongst the praises of their *Hermes*, though they were very forward to magnifie him, and to ascribe unto him a great many *Elogies*. Nay, when they do recount the Authors of their Chymistry, though they do not a-

gree about them, yet there is none that transfers that honour upon this *Trismegistus*. But whether *Æsculapius*, or the wicked *Angels*, (to both which the Invention is attributed) were the discoverers of Chymistry, I think I may allow the *Egyptians* to have been the first Practisers of it, and that there wanted not those

D.

those who did mention *Hermes* amongst them that used that *Art*, and were esteemed *Philosophers*. Nor is the *Egyptian Chymistry* of any great Antiquity, there being no mention of it in any *Greek* or *Latine* Writer, till almost the fourth Century after *Christ*. Neither is the name only of *Chemia* or *Chemistry* of so modern a date:

Vide Conring.
c. 3 p. 28.

but there is not any record of any book written, or work performed, that imports any such thing. Yet have the *Alchymists* (it is true) pretended to a greater Antiquity, entitling several spurious books to *Hermes*, *Moses*, (and *Miriam* his Sister) *Democritus*, *Plato*, *Aristotle*; and made as if their *Art* were intimated in the fable of the *Golden Fleece*, the *Hesperian Orchards*, and the *Song of Solomon*. In which I cannot but take notice of the different procedure of those *Chymists*, and our *Experimental Philosophers*: the one attributed all glorious discoveries to the *Ancients*, their *Predecessors*; these will not allow them those praises which indisputably belong unto them. But however, that I may grant our *Virtuoso*, that *Chymistry* did flourish in *Egypt* in such manner and at such time, as I have declared out of *Conringius*, (to whom I refer the inquisitive Reader) yet I must not gratify him with this other concession, that from them it came to the *Arabians*, the followers of *Aristotle* not being at all acquainted with it, nor the *Greeks*, or those disputing Ages, being at all conversant with it. For it is made evident by *Conringius*, (c. 26. p. 368.) that it passed from the *Egyptians* to the *Greeks*. There are of *Greek* Writers, *Zosimus Panopolita*, *Olympiodorus*, *Stephanus*, *Synefius*, *Michael Psellus*, *Blemmydas*, and many others, which are instanced in by the same Author, and deduced through the several Centuries antecedent the *Saracen* Empire. The very name of *χημεία* or *χημεία*,

In the time of Constantine A. D. 320. Firmicus is said to be the first that is recorded to have named *Alchimia*; he saith, that *Sarurn* disposeth to *Alchimy*. Whence Libavius argues that it was then an *Art*, and had been long practised, or else how comes it under Astrological Prediction? But there is no consequence in that reason of his it being usual for Astrologers to accommodate the Stars so as to have an influence upon novel inventions. Under Theodosius the Great, A. D. 38. Heliodorus writ a book to the Emperor about the *Chymistry*, and something about that *Art* to *Crassus*, as Cedrenus witnesseth. Libavius in Exam. censur. Parisiens.

Several of these *Greek* Writers were seen by Salustianus in the King of France his Library and by Reynsius, (vide var. lecti n. l. c. 5 p. 151.) who transcribes this passage as the Conclusion of one of them: *Τίτωση δ' οὐλα. ἡ τὰ ἰνδὸματι ἔτι ποικίλων Ἀρχὴ Πλάτων Ἀεὶ σούτης, ὡαντες ἱεροὶς Διωκότατος, Ζώ-*

οτι ος μινος 'Ολυμπόδωρ & Στίμων
 ο ειλίοροφ, Σοφιστὴς ὁ ἐκ Περσίδι, Εὐρί-
 ος, & οἱ ἄλλοι Αἰγύπτου, test any one
 should think that by *ωινταί* were meant
 our Wines, and Poets, and inventors. I
 must add, that it is a name long ago fix-
 ed upon the Chymists and Chrysippore-
 ticks, as *Reynolds* declares.

is Greek, as *Vossius* observes, *de Philos.*
 c.9. The Moorish particle *Al* being
 prefixed. Nor is the word *Alembex*
 of any other original, being compounded
 of the said *Αλ* & *αμβέξ*, a term used by
Dioscorides to signify a vessel, not much

unlike our *Limbeck*s. *Diosc.* l.5. c.64. vid. *Conring.* & *Voss.* ubi
 supra. From the Greeks together with other Learning, even
 Chymistry was transmitted: and *Geber* himself (as *Leo Afer*
 relates it, *lib. 3. pag. 136.*) was but an Apostate Grecian. This
Geber is the most ancient of Arabian Alchymists, their Idol,
 and styled *Magister Magistrorum*. I am not ignorant that
Conradus Gesnerus (in *præf. ad Evon.*) and some others
 have reckoned upon *Geber* as if he had been originally a
 Saracen, and the Nephew of one *Mahomet*: some say he
 was the Grandchild of the Impostor *Mahomet*: but their
 credit is not equal to that of *Leo Afer*, who appears a most
 learned person, and inquisitive even to Curiosity into the
 Lives as well as Customs of the Moors, his Countreymen.
Habent Fessani Arabes multa Chémica artis opuscula a viris
doctis conscripta, inter quos potiore locum habet Geber, qui
centum annis post Mahometen vixit, quem natione Gidum aiunt
fidem abjurasse.—*Gesner* cannot tell at what time he lived,
 but he saith he was not the Inventor, but Illustrator of the Art
 of Distillation.—*Quamquam non illum primum hujus Artis*
Inventorem, sed Illustratorem fuisse existimo. Hoc in opere
quod summa perfectionis inscribitur, de distillatione in Ge-
ner Multa pulchre differens, varios distillandi modos
sepe omnibus rotos esse scribit: nimirum ut vetus quoddam suo
seculo, non recens quoddam inventum.

Geberus quem
 volunt circa
 annum P. R. 111
 virginis sex-
 centissimum
 in vivis fu-
 isse Liban ex-
 am censur. Va-
 lilius.

Leo Afer Hist.
 Africa l.3.

Conrad Gesn.
 in p. pref. ad
 cry n.

But though the Greeks were not free of the Metal-
 lurgical part of Chymistry, yet did they not prepare any
 Medicines Chymically (that I know of,) except it were
 the Alcalifate Salts, and Ecchylemata, or Juices formed
 into Extracts, and Oyls drawn per descensum. This seems
 manifest in that *Oribasius*, *Aetius*, *Paulus Aegineta*, *A-*
lexander Tracheanus, *PAULUS & JOANNES* *Philoso-*
phista

phista of *Alexandria*, *Simeon Sethus*, *Actuarius*, *Nonus*, and others mention no such Medicaments: no, nor *Michael Psellus*, though he writ a peculiar Tract about *Chemistry*. Neither hath *Nicolaus Myrepsus* (though a modern *Grecian*) any *Chymical* Preparation.

Conringius
c. 26. p. 370.
Geiser. in praefat. ad Eudonym.

The *Arabians* seem the first that ever accommodated *Chymistry* in an eminent manner to *Physick*; if it be true, as *Libavius* imagines; that *Abulchasis* did live in the time of *Muhauia* the *Saracen*, that settled their Empire at *Damascus* Anno Dom. 660. *Chymistry* then seems to have been regulated into an Art; He writ a Book of *Physick* called *Servitor*, which principally treats of *Medicines Chymically prepared*, and useth the terms of *reverberation*, *calcination*, *coagulation*, *distillation per ascensum & descensum*; and many such like expressions, together with *Processes* purely *Chymical*. It was then that *Alchymie* was called *Perfectum Magisterium*; and that which we call *Oyle of Bricks*, did bear the name of *Oleum Sapientia & Perfecti Magisterii*.

Libav. in exam. sent. Paris.

So *Avicenna* speaks not only of *Rose-water* distilled: but of *Mercury* and *Arsenick* sublimed: after him *Joannes Mesues* shews how to make several *Chymical Oyls*, as of *Amber*, *Wheat*, *Oleum Philosophorum*, &c. Neither is it to be doubted, but that there were an infinite number of *Chymical Processes* latent in the hands of particular *Artists*, since *Joannes Mesues* refers us unto them, viz. *de quibus loquuntur, qui quae sunt occulta in rebus manifestant & detegunt. Hos quoque aggredere rei hujus cupidus tam famosa apud illos.* After that the *Western Christians* were civilized and instructed in the *Sciences* by the *Moors* inhabiting *Spain*, and that *Physick* superstructed upon the principles of *Galen*, *Avicenna*, and *Averroes*, was derived unto them, those *Sectators* of the ancient *Philosophy* improved *Chymical Pharmacy* very much.

Conring. ubi supra. § 3: 4.

Vid. Conring. ubi supra.

Read Libav. more fully upon this subject in Exam. censur. Parisiens.

Not

Conring. ubi
supra, c. 27. p.
377, 80, &c.

Conring. ibid.
c. 28. p. 187.
Erastus de
metall. p. 34.

nor were *Albertus Magnus*, *Aponensis*, *Gentilis de Fulgineo*, *Arnoldus de villa nova*, *Raymundus Lullius*, or *Joannes de Rupe-scissa*, or *Isaacus Hollandus*, or *Basilus Valentinus*, or *Antonius Guainerius*, or *Michael Savonarola*, or *Montagnana*, or *Hieronymus Schallerus*, and *Magenbuchius* (Chymical Physicians at *Norimbergh* before *Paracelsus*) or, *Guilielmus Varigana*, or *Antonius Fumanellus*, or *Wolfgangus Talhenserus*, or *Hieronymus Brunsvigus* (the first that writ of Chymistry in the German tongue) any other then Pretenders to the ancient Physick and Philosophy. There was no faction betwixt the Physicians in those days; nor did they undervalue or decry each other; They rather represented themselves to be Adherents and Sectators of *Aristotle*, then his Enemies; and chose rather to sophisticate his fourth book of *Meteors*, to shew that great Man knew all things, then condemn all his other works, as if he knew nothing. Nor were they only followers of the *PERIPATETICKS*, but I finde the Chymists, that did precede *Paracelsus* to be accounted *Hippocratical Physicians*: witness this passage in *Caspar Bravo*, who inquired more into them then I have had leisure to doe.

Caspar Bravo Resolut. Medic. part. 1. disp. 1. sect. 1. resol. 3. sect. 2.

With him agrees *Libavius* in the fore-cited Treatise.

Resolvendum, artem Spagiricam veterum Spagiricorum, quam Avicenna, Geberus, Rhafu, Arnoldus de villa nova, Raymundus Lullius, Blemmydas, Bracefseus, Virceanus, Joannes Augustinus, Panterus, Isaachus Monachus, Morienus, Zosymus, & alii Hippocratis Sectatores professi sunt diversam esse a Secta Paracelsifica. With this agrees that passage of *Conringius de Med. Herm.* c. 28. *Certe ante Paracelsum haud est observare in Chemicorum scriptu singularem aliquam sive Hermeticam, sive Chemicam Medicinam. Observata autem est plerumque medendi illa via quam Hippocrates, Galenus, horumque Sectatores cum Graeci tum Arabes, interq; eos Avicenna calcaverant: quod unum Arnoldum Villanovanum legenti non potest non Sole videri clarius.* So *Primrose de vulg. Error.* l. 4.

c. I. *Hæc medicamenta præparandi ratio non a Paracelfo inventa est: sed multis ante Paracelsum natum seculis exculta fuit ab iis etiam Medicis qui Galeni doctrinam sectabantur, ut Raym. Lullio, Villanovano, &c.*

But when Paracelsus was seized with the same spirit that seems to sway some of the Virtuosi: then did he begin to decry the study of Languages, as loss of time; our Wits call it Pedantry. He vilified Logick as that which caused endless disputes, and darkned rather then discovered Nature: He calls it *matrem odii, rixarum & litium*; He prohibited the reading of other good and Ancient Authors. He seemed to be of no Religion; and if for any, it was to be without Metaphysicks, without the mixture of Glosses and Interpretations, *Solum textum Scriptura legendum, interpretationem nullam adhibendam*. He calls upon all Universities and Countreys to resort unto him, to follow him and his new discoveries, his real Philosophy, his Essential Anatomies, all other performances being but empty and verbose.

Because I observe som resemblance betwixt the invitations of Mr. Sprat and his, I will set one of his passages down in the Preface of his Paragranum, viz. *Me sequimini; Non ego vos sequar. Me, me, inquam, sequimini, Avicenna, Galen, Rhases, Montagnana, Mesue. Me sequimini; non ego vos sequar, Parisienses, Monpelenses, Suevi, Misnici, Colonienses, Viennenses, qui Danubium & Rhenum accolitis. Vos item Insula marina, Italia, Dalmatia, Athenæ, Græci, Arabes, Israelitæ, me sequimini, non ego vos sequar. Mea enim Monarchia*. Hereby any one may see that He was as conceited of himself, and as great a contemner of all ancient Learning, and of Aristotle, and Galen, &c. as some of the Virtuosi: and as ignorant of Latin and other tongues; and as false and imperfect in his relations; as variable in his hypotheses, as if he held nothing but with the power of revoking it, which is a great qualification of a modern Philosopher. He was not for the particular methods in vogue, but for a general Enquiry into the Experiments of old Women, Mountebanks, Hangmen, Husbandmen, &c. He could make use of the writings and inventions of others, concealing their names, and boasting them for new and his own,

H

Sed in primo de pestilente tractatu primo, ubi de Chelidonia contra imaginationes Magicas amuleto differit, adeo non rejicit Galeni & Hippocratis decreta, ut etiam amplius videtur velle Galeni ius, quam omnium scholarum profectores publici. Libavius ubi

as supra.

as becomes a modifi Experimentator. To evince this last assertion, I shall set down some passages of *Crato*, and others, to shew that the disputing Ages were not so ignorant of *Chymistry* as Mr. *Glanvill* pretends. *Crato* in a Letter to *Eraſtus* writes thus; *Remedia quibus aliquando usus esse dicitur, non illius esse ex eo certus sum, quod librum vidi ante ducentos fere annos a Monacho quodam Ulma scriptum, in quo eadem medicamenta, qua ille frustillatim, nunc in has tunc in illas chartas sparsit, perspicue sunt scripta.*—And elsewhere, *Fuit in bibliotheca viri optimi & integerrimi Marci Singmoseri Sacratissimi Imppp. Consilii a Secretis primi, liber ante ducentos annos a Monacho quodam exaratus. Eo multis mensibus usus sum, & omnia qua isti (Paracelsici) tanquam in Eleusiniis sacris mussitant, tam evidenter tradita, ut neminem fallere possent animadverti. Ille himself confesseth who were his teachers in Chymistry, and that he was far from being the first Inventour of it.* “*Theophrastus Paracelsus natus anno Christi 1493. mortuus 1541. Hic non erubuit confiteri se remedia in Chymicis accepisse, & his ipsis Scientiam Artis Chymiae debere. Antiqui Philosophi (ait in 2. parte Chirurgia mag. tractat. 3. c.1.) studiosi indagandarum longa vita causarum (recitamus breviter sententiam) destituti vero perfecta praparandorum componendorumque medicamentorum scientia ab Alchymistis eam petere non sunt veriti, atque sic utronemque laboribus conjunctis genuina praparandorum remedium Scientia exorta, & variis Chemicis experimentis in medicinam transfusus est aucta, maxime vero tincturis & floribus metallicis, quarum tincturarum quantafuerit efficacia, antiqui ea de re Codices testantur, quos diu a Pseudomedicorum turba suppressos, nos publicos facere non dubitavimus. Remedia nostra ex Chymicorum Schola prodisse non dubito fateri: & quoniam Chymica ars infinitis erroribus scatere visa est, illud quoque Augia stabulum rearguendi laborem sumpsimus: in quo feliciter mihi versari licuit, quod ob ineunte atate magna Artis studio captus summa diligentia sub excellentissimis praeceptoribus Arti huic studuerim. Praeceptores enim fuerunt Wilhelmus Hohenheimius Pater, & alii infiniti: praeter hos quoque scriptis adjutus sum Setthagii Episcopi,*

Eraſtus part.
4. p. 300.

Paracelsus Ex-
erch. Scali-
ger.
Hartman &
Collins pub-
lished no new
medicines.
Ceterum neq;
Crollium neq;
me a liquid
nisi procul-
scilicet libente se-
temur, neq; ea
unquam utri-
usq; nostrum
mens fuit.
Hartman in
not. ad *Croll*
p. 18.
Libavius ubi
sui ra.

"*piscopi, Erhardi Laventalis, Nicolai Hipponensis Episcopi,*
 "*Matthaei Scheebii Suffraganei Treisingensis, Abbatis Span-*
 "*heimii, aliorumque doctissimorum Chemicarum: Quin & va-*
 "*riis eorum experimentis factus sum locupletior, inter quos ho-*
 "*noris causa nominandus mihi venit nobilissimus vir Sigismun-*
 "*dus Fueger Schwathensis, qui magnis sumptibus pluribus mi-*
 "*nistris sustentatis Chemicam accessione locupletavit. Hæc ibi*
 "*Paracelsus. Neque vero falsa scribere est putandus,*
 "*quandoquidem seculum istum & exercitiis Chymicis &*
 "*voluminibus scaruit, cum jam plures tractatus typis*
 "*publicis sint impressi, nihilominus cernimus, subinde ex*
 "*tenebris prodire plures, ita ut ne Thesauri quidem multi*
 "*videantur sufficere cupiendis, nec Theatra.*"

His followers confess, that he borrowed much out of *Basilii Valentini*, and more out of *Isaacus Hollandus*, as *Penottus* declares, *Cum incidissem in Isaaci librum de opere vegetabili, reperi de verbo ad verbum doctrinam de tribus principiis, & de separatione quatuor Elementorum ab eo desumptam. Unde constat illum præcipua sua Opera suffuratum fuisse, atque hinc inde expiscatum: ut de gradationibus medicinarum ab Arnoldo, Archidoxa a Raymundo Lullio ex sua Arte operativa: de Arcanis a Rupefissa; nihil prorsus a seipso præter convitia: & maledicta: a Trithemio varia.*---The same is confessed by *Quercetan* somewhere as I remember, and he himself intimates it by adding to many preparations the words, *Ex nostra correctione, ex mea emendatione.* Out of all which it is evident, that neither the Grecians, nor the disputing Ages were so ignorant of Chymistry, as Mr. Glanvill asserts; as it is certain that the Arabians as well as the Grecians were disputers and followers of *Aristotle* and *Galen*, and that particularly *Albertus Magnus* and *Roger Bacon* were Schoolmen. Nor can any man doubt the fame of those other Bishops and Monks, who knows with what perfect Veneration, in those days *Aristotle* was regarded. How useful and how luciferous their Processes were, it is not for Mr. Glanvill to judge, who is ignorant of them: but any one will allow them, both the one and the other, recommendation, who considers that their Chymical Processes which passed amongst them gave occa-

De decar. medic.
dic.

Vide Con-
ring. de med.
Herm. c. 21.
p. 252, 253.

tion to all, and make a great part of the improvements in Chymistry, in Dioptricks and other Subjects, wherein our Virtuosi pride themselves. Particularly as to Chymistry, it is as clear that the disputing Ages and followers of Aristotle were acquainted with it, and eminent for it, as that there were Monks and Schoolmen. Those men whom Mr. Glanvill so explodes, and with whom the Historian disports himself, had of late years before Paracelsus, in a manner, solely the knowledge of this Art by which Nature is unwound, &c. This Sennertus granteth. Proximis seculis fere inter Monachos latuit Chymia, quorum non pauci illud, quo abundabant, otium post sacras meditationes & orationes, arti huic praestantissima honeste tribuerunt: inter quos fuerunt Raymundus Lullius, Albertus Magnus, Joannes de Rupe-scissa, Savanarola, Morienus, Rogerius, Trithemius, & Frater Basilius Valentinus: quorum scripta multa hoc seculo in lucem edita sunt, & multa adhuc manuscripta passim latent. I hope there is no exception against Sennertus, how partial soever Erasmus or Crato may seem. And to affront our Virtuoso a little more, it was a follower of Aristotle, and those Disputers, a pitiful School-Divine that discovered the making of Gun-Powder, which single invention out-does all that our Collegiater boast of. In the year 1354. Bertholdus Schwarz a Benedictine Monk discovered it, and I dare warrant him in those days no enemy to the man of Stagyra, the Idol of disputers; A very ancient Manuscript gives him this Character. Bertholdus Schwarz Goslariensis Monachus ordinis Sancti Benedicti, cum mire Chymicis delectaretur, atque eorum peritia jam magnam sibi nominis existimationem acquisisset, &c. Any one may read the rest in Kirchers Mundus subterraneus l. 12. sect. 5. part. 4.

I shall relate some particular processes in Chymistry, which are mentioned by such as were not Arabians, but of a much more ancient date. In the time of Julianus and Valentinianus Emperours lived Aetius Amidenus; he and Nicolaus Myrepsus (who is indeed later then Mesue) do mention the distillation of Oyls per descensum, as Gesner shews; and Vossius together with Conringius avow

Nicolaus

De Conf.
Chim. c. 3.

Vossius de
philosoph. c.
12. sect. 12.
Gessn. in praef.
ad Eusebium.
Vossius de
philosoph. c. 13.
Conring de
med. Herm. c.
26. p. 371.

Nicolaus Myrepsus (or Prapositus) in quo illud miror nullam ab eo aquarum oleorumve Chymisticis instrumentis paratorum mentionem fieri. Capnifsum tantum oleum, quod per descensum distilletur, describit, ut Aetius quoque. As to the ways of making Chymical Extracts, let any man judge whether the Grecians were ignorant of them, by these passages, as they are cited by Gunterus Billichius, viz. Chylismata extrahuntur aut exprimuntur. Extrahendi nec ars nova est, nec novus modus, quanquam Heurnio ita visum sit Method. ad praxin. lib. 1. & lib. 2. c. 25. Rationem ejus a Dioscoride accipe, verbis interpretis Ruellii lib. 3. c. de Gentiana. Contusa, inquit, radix quinque diebus aqua maceratur, postea in eadem tantisper decoquitur, dum extent radices, & ubi refriguit aqua, linteo excolatur: mox discouquitur, dum mellis crassitudo, fiat fœcilique reconditur. Similia cap. 9. ejusdem libri de Centauryo minore habet. Dabo tibi ipsissima Dioscoridis verba; *Χυλίζεται ὁ πύα συλλεσμένη ἰσχυρῶν ἕσα σπέρματι, καὶ ἀποβρεχόμενη ἡμέρας ἑ. εἴτα ἐψεται ἀγχοῖς ἀν' ὑπερήχοι τὸ ὕδωρ ἰσχυρῶς τὴν ψυχρότητι, ὑλίζεται δὲ ὀθονίῳ διαλείποντι πύας, καὶ πάλιν ἐψεται μέχρι μελιώδους συστάσεως.* Nequid ad plenitudinem artificii deesset, subjungit; Quod siquid concretum faucibus vasis adhaerecat, deradunt, reliquoque humori permiscent. Item hac; Quae autem ficcis radicibus aut herbis liquamenta exprimuntur, decocta (ut in Gentiana mentione retulimus) praparantur. Ita Lycium & Abscynthium, hypocistis, & consimilia coguntur. De Lycio vide cap. 135. lib. 1. de hypocistide libri ejusdem cap. 128. Chylismatis denique absynthini, cap. 26. meminit. Nec aliter Extrahum Melampodii clarissimus Raymundus Mindeferus concinnavit, quod in Pharmacopœia Augustana inter Ecchylismata Cathortica locum non postremum reperit. Ut liqueat, extrahendi artificium, dignum omnino fuisse, quod & erudita antiquitas inveniret, & non degener posteritas imitaretur. Nec quicquam Chymia novi, prater liquorem attulit.

Observat. &
paradox.
chym. l. 1. c. 2.
p. 2.

Dioscorides
lived in the
days of Cleo-
patra and
Marc. Anton.
whose Physi-
cian he was, a
far lower of
Herophilus,
and conse-
quently of
Hippocrates
and Aristotle.
Vide Voss de
philos. c. 11.
sect. 40. &
Jansium de
script. hist. &
p. 1. 2. c. 6.
p. 145.

Concerning *fixed* and *Alcalisate Salts*, the *Chymists* and *Chymical Physicians* make a great noise: and undoubtedly the *Invention* is very *extraordinary*, and their use very *singular* in *Medicine*. Yet both

See the antiquity of the use of Alcalisate and other Salts by the Ancients, largely proved by M. Rulandus progymn. alchym. qu. 14, 15.

Vide Galen, de Theriaca sub finem, & Pharmacop. Augustan. in append. ad antidot. class. de Salib. Theriacal.

G. Bellichius observat. & paradox. chym. l. 1. c. 2. p. 30. & in Thesalo chymicum. c. 7. p. 90.

the preparation and the use of them is set down by *Dioscorides*, *Galen*, and *Actius*, in their discourses about *Theriacal Salts*; Though latter days have reformed the preparation, as *Galen*

endeavoured to do that which he found in use in his time. Besides, I observe out of *Gunterus Bellichius*, that *Aristotle* was not ignorant of it. *Aristoteles auctor est, Umbros cinerem harundinis & junci decoquere aqua solitos, donec exiguum superesset humoris: qui ubi refrigisset, salis copiam fecerit*, lib. 2. meteor. cap. 3. Hoc se apud *Theophrastum* invenire *Plinius* testatur, lib. 31. cap. 7. Idemque non *harundinei* tantum *juncique* salis meminit, sed *columni* insuper, & *querni*. *Amborum auctoritate* (nam de *Theophrasto* nihil mihi constat) *Chymicorum castigabitur temeritas, quæ suis inventis salern cineritum annumerare ausa est*.

The preparation of *Salt-peter* with *Sulphur*, in order to the making of what the *Chymical Physicians* call *Sal prunella*, was known to *Hippocrates*, and others of the ancients, and they used it in *Squinosses* in *Gargarismes* for the tongue and throat. *Definant in posterum Chymici de lapide Prunella magnifice gloriari. Nam & apud Hippocratem τὸ νιτρὸν ὀνὶον quater invenimus. Semel quidem in tertio de morbis: bis in de internis affectionibus: denique semel in lib. de morb. mulier. Ac ne dubites erudite antiquitati cognitum eum lapidem fuisse, Plinius auctor est, nitrum frequenter liquatum cum Sulphure coqui in carbonibus, sulphuri concoctum in lapidem verti. Hac recognosce ex lib. 31. cap. 10.* And the same Author saith elsewhere, *Præ aliis omnibus inclaruit νιτρὸν ὀνὶον Hippocratis seu lapis Plinii nitrarius, dictus a barbarorum pruna seu angina, cui singulariter mederi perhibetur. Nec nova est quæcunque ea laus. Nam & Hippocrates abstergenda Saliva & emuco, ac facilitanda excreationi nitrum anginosi obtulit, inditque*

G. Bellichius observ. chym. l. 1. c. 5. p. 49.

G. Bellichius ib l. 2. c. 5. p. 119.

ditque collationibus Oris. Lib. 2. de morbis, sect. 49.

Neither is the way of *subliming Flowers of Benzoin*, any thing else then the imitation of that way which the *Ancients* had of *condensing Soot*. So *Bellichius* informs me, *Fuligo, deficiente Scaligero, cujusque rei pinguis crematilis pars est, ac demum aliarum rerum fumus condensatus, Exerc. 56. Modus consicienda ejus, siquid artificii subest, apud Dioscoriden extat, lib. 1. c. 85, 86, 94, 97. imitatio apud Beguinum, quando Benzoinum defloravit, l. 2. c. 18.*

Id. lib. 1. c. 2, p. 3.

It may perhaps be granted by most intelligent persons, that the making of *Extracts*, and *fixed Salts*, and such instances of *Vegetables* being prepared as I have given, and the glory of those inventions cannot justly be denied unto those disputing Ages; but that the preparation of *Minerals*, and the medicinal use of them inwardly, is a discovery the ancient times were not acquainted with. And this is the judgment of many learned men. But in refutation of it, seeing that the inward use of *Antimony*, as it is several ways prepared, refers to *Basilius Valentinus*, and before his days; since that, sundry preparations of *Mercury* are more ancient then the humour of *Novellism*; since *Paracelsus*, *Hartman*, *Crollius* did but publish the processes of *Aristoteleans*, *Avicennists*, and such like *Monks* and *Physicians*; all that our *Virtuoso* can derive from this *Plea* is, that the *Arabians*, adherents to the old *Philosophy* and their followers, did improve the extent of *Chymistry*, and added thereunto as they did in the other practice of *Physick*, the use of *Rhubarb*, *Cassia*, *Manna*, *Tamarinds*, and other benign medicines: and this demonstrates that *Philosophy* and those notions not to be so *steril*, as they are represented in comparison of the *Fecundity of the Cartesian Principles*, from whence *Physick* hath received little (if any) benefit or advantage. But to raise this Enquiry beyond the times of the *Saracen Empire*, it is manifest out of *Pliny*, that *mineral-waters* were drunk in those ancient times: and that the *Stomoma* or rust of iron, as also that drinks in which Iron was quenched, was given in the time of *Dioscorides* and *Galen*. That *Brimstone* was given inwardly by *Hippocrates* to *asthmatick* persons. That the *Squamma*

Disc. 1. 5. 9.

13. Galen. 1. 1. de cuporia. c. 17.

ari

Hippocr. de
vict. in morb.
acut.

Vide Döring.
de medicina,
p. 217. Ru-
land pro-
gymn. qu. 20.
Brassavol. de
med. p. 177.
Poterius.
Pharmacop.
Spagir. l. 1. c.
6.

Döring. de
medic. &
med. p. 179.
Vide & Ru-
land. pro-
gymn. Alch.
qu. 20.

eris was given inwardly, as a *purge* and *vomis* by *Hippocrates*, *Galen*, *Dioscorides* and *Gelsus*: and the Experiment happily tried by *Brassavolus*, that great *Experimentator* again of later years. So the giving of *Sandaracha*, or *Orpiment* inwardly for old coughs; and the *suffiment* made out of it, are recorded by *Dioscorides*: the trochises of it recommended anew by *Mesue*, and the more modern trials in *Riverius*. Even *Chalcitū* is an ingredient in the ancient *Treacle* of *Andromachus*. I shall conclude all with the passage of *Doringius* in the place already cited, *Præter Sandarachum Isidorus, Athenæus, Idius, Eubulus, Heras, Gemellus, Agathius, Nicofratus, Menander, Thanyros, Deletius Epagathus, Asclepiades, & alii: Alumen scissum, Auripigmentum, Aeris squammam, Æs ustum, Calcem vivam, Sulphur vivum, faces undæustas, Cadmiam, Cerussam, Gypsum, Stibium sive Antimonium in pastillos redacta dysentericis præscripserunt: quorum præparandirationem & utendi modum vide apud Galenum lib. 9. de compos. med. sec. loc. c. 5.* Out of which passages any Reader will guess what President later Authors had out of the more remote *Ancients* for the giving *minerals* inwardly; and if we are just to the *Arabians* and their followers, we shall scarcely allow them any further honour, then to have found out some new ways to serve up old dishes.

I shall adde, that in *Egypt*, at such time as the repute of the *Egyptian Priests*, and their phantastical *Philosophy* had given way to the followers of *Hippocrates, Aristotle, Herophilus*, and others, that introduced the *Grecian Learning* there, that is, in, and somewhat before the days of *Dioclesian*, the *Egyptians* were *Masters* of that Secret of making *Gold*, which our inquisitive *Moderns* have so vainly sought after. Before that Age there is no mention of it, and then it is said they had such knowledge of the *Art of making Gold*, that thereby they were enriched and impowered to make War upon the *Romans*; and being overcome by the Emperor *Dioclesian*, he burned all the books which they had, containing the *Mysteries* of that *Art*, to prevent any future commotions of that *Nature*. So *Suidas* in the word Χαμεία, ἡ τῷ χρυσῷ καὶ ἀργύρῳ καὶ ασκευῇ, ἥ τὰ βιβλία διερευνήσα-

ἡσαύτω. ὁ Διοκλητιανός, ἔκαυσε διὰ τὰ νεώτερά τιν' Ἀι-
γυπτίους. And in the word Διοκλητιανός he says, ὁ δ'
δὴ καὶ τὰ περὶ χημείας χρυσῷ καὶ ἀργύρῳ τοῖς παλαιῶν
γεγραμμένα βιβλία διερευνησάμενος. ἔκαυσε πρὸς τὸ μηκέτι
πλῆτον Ἀιγυπτίους ἐκ τ' τοιαύτης προσγίνεσθαι τέχνης, μηδ'
χρημάτων αὐτοῖς θαρρύντας περὶ τὴν πομπὴν Ῥωμαίοις ἀν-
ταίρειν. The renown of this Story is not questioned by the
Chymists, and I finde the learned Joannes Langius to give cre-
dit unto it, quoting for the truth of it in his margin, be-
sides Suidas; Orosius l. 7. c. 16. And Paulus Diaconus in the
life of Diocletian: Neither doth Libavius or Rolsincius
elevate the authority thereof, though he mention the pas-
sage of Suidas. And to give a further colour unto this re-
lation, I am informed that Aeneas Gazaus, who lived in
the latter end of the fifth Century, when Zeno and Anasta-
sius were Emperours, treating of the Resurrection, hath
this passage, Παρ' ἡμῶν οἱ περὶ τ' ὕλην σοφοὶ, ἀργύρον καὶ κατ' ἴσιν
πολλὰ λαβόντες, καὶ τὸ αἶμα ἀφανίσαντες ἐπὶ τὸ σερμνότερον μέτα-
λλον τ' ὕλην, χρυσὸν κάλλιστον ἐποίησαν. But these Nar-
rations are rejected by such as deny that other metalls may
be transmuted into Gold: It is replied by Erastus, that either
those Egyptian books contained nothing but the Art of melt-
ing down of metalls, and separating the latent Gold there-
from: or that Suidas being a late writer, living but 500
years ago, about 800 years or more after Diocletian, might
have been imposed upon by the Chymists of those times (in
Greece, and during the disputing Ages! mark that Mr. Glan-
vill) who even then might have feigned some such stories as
that (and the Allegorising of the Golden Fleece) just as they
have within the last Centuries counterfeited the Works of
Moses and Solomon, and entitle them unto their Fictions.
There are an infinity of stories in Suidas, which render his
Assertions suspected: and in this he hath not the counte-
nance of any ancient Writer to second him. It seems strange;
that the Romans having so long ruled in Egypt absolutely,
and their Governours, they not being to be supposed free from
all desires of gain, how they should never apprehend the Ar-
tifice, nor have the least mention of it in their Writers

Joan. Langii
Ep. med. l. 1.
ep. 13. de O-
rig. Alchym.
But Oros. and
Paulus Diaconus were cre-
dulous Wi-
ters, and of
little repute.
Libavius in
exam. censur.
Paris. us.
Rolsincius
chym. Art. no.
redact l. 1. c.
10 & Cen-
ring. de med.
Herm. c. 3. p.
21.
Erastus de
metallis, p.
103.

Conring. de
med. Herm.
c. 3. p. 23.

Id. ib. p. 22.

De plant. res-
suscit. vide
Bellic. Thes.
lat. red. v. c. 7.
Rolfinc. art.
chym. l. 6. c. 3.
& l. 7. c. 19.

(Greek or Latine) till the end of the fourth Century: and that so remarkable a passage as this is should be omitted by those ancient Writers, who relate both the war and actions of Diocletian after his victory. As for that saying of *Anas Gazau*, it is replied that he speaks by *hear-say*, rather than certain knowledge of the operation: that there have not wanted many learned persons, who have with a great deal of confidence, illustrated the *Resurrection* by contemplations of the *Phoenix*, and of the forms of Plants resuscitated in their several Salts, as if both were realities: yet is there no such thing as either the one or the other.

Out of all which it is evident that *Chymistry* was a practice known and in use among the Sectators of *Aristotle*: and that the Grecian and disputing Ages were not unacquainted with those Processes, though these latter times have been more various and inquisitive, and have reduced that Art into better Method, and enlarged the Practice of *Physick*, with an infinity of Medicines: and indeed we must confess our eyes very much obliged by the labours of ingenious *Chymists*, and that they have afforded multitudes of Experiments, such as contribute to the delight of all Philosophical heads, and to the Cure of many that being sick; have either better opinion of Chymical Medicines than of others, or are pleased with their small, and commonly more pleasant dose.

See this largely disputed by
Libavius in
exam. censur.
Parisienf.

Vide Kerger.
de fermentat.
sect. 1. c. 3. p.
10. & Rolfinc.
chym. in ar.
red. l. 1. c. 19.
Conting. de
med. Hermet.
c. 22.

But that those parts into which *Chymists* reduce things, are latent in the compound body, otherwise then by the *Aristotelean* distinction of *formaliter* and *materialiter* (so much laughed at by Mr. *Glanvill*, pag. 119.) This is an Assertion which doth not become any man that pretends to have read Mr. *Boyle* in his *Sceptical Chymist*, where that Point is too amply debated to be here transcribed, or ever (I think) refuted. Having denied Mr. *Glanvill*, that by those useful and luciferous processes, Nature is unbound and resolved into the minute Rudiments of its composition. Which Rudiments were not made use of at the first Creation, when one *Fiat* created those compound bodies, which *Artful Fires* sometimes (and but sometimes) analyse into several parts, as Salts, Oyle, or Sulphur and Spirit, and those grosser Elements of Earth and

and water. All which are *not* found in many bodies, (and when they are, it is with a great discrepancy betwixt those of one Concrete, and those of another) nor any of them to be separated from Gold. ~ Which *Libavius*, no, nor *Dr. Willis* doth not make to be the *last unmixt*, and *simple Constituents* of natural bodies, *sed ejusmodi tantum substantias, in quas veluti partes ultimo sensibiles res Physica resolvuntur*: Substances into which natural bodies are resolved finally as far as sense can judge, and when the *Analysis* is prosecuted in one sort of procedure: for another method, different *Solvents*, and different *Fires* discover different parts, and those sensible too from what the usual *Chymistry* builds upon. Having denied him this, I must further tell him, that when the *Countraywoman* sets her Eggs to be hatched, she produceth by those means such bodies as no *Chymical* fires with their vexatious *Analysis* ever would discover: so she doth when she doth brew and churns her butter. Nor is this more evident, then it is clear that the *Chymical principles*, when they come to be accommodated to the solving of the *Phanomena* in nature, or in diseases, have as much of darkness and dissatisfaction in them, as occurs in the *Peripatetick* way: so that now we are more dubious, not more knowing, then before: and this any man that hath considered how the *Chymical Physicians* disagree about the causes of diseases, and even about the common *Phanomena* of Nature, will easily grant me: nor will it appear less manifest, that if the *Chymical hypotheses* do take place, that it will subject the *Mechanick Philosophy*, and establish that of *Anaximander*, revived by the ingenious *Berigardus*.

De ferment.
c. 1. p. 4.

But Mr. Glanvill adds, "That Chymistry directs Medicines less lothsome, and far more vigorous, and freeth the spirits and purer parts from the clogging and noxious appendices of grosser matter, which not only binder and disable the operation, but leave hurtful dregs in the body behind them." — This Plea for the preferring *CHYMICAL* Medicines before those commonly called *Galenical*, is much insisted on by *Beguinus*, *Quercetanus*, and others of that way. Yet, first it is observable, that whether we regard taste or

Plus ultra,
p. 11.

smell, those very *Authors* recommend as *odious medicaments*, and as *loathsome*, as ever *Coerdae* or *Fossius* in their *Dispensatories*, if not worse. Will any man in his *Wits* condemn *Wormwood* and *Centory* because of their *bitter taste*, or *Cassoreum* for the *smell*? Secondly, every thing is not the *better* for being *extracted*. Thus the *Extract* of *Rhubarb*, though quickned with its *Salt*, is not so *efficacious* as plain *Rhubarb*, except it be sophisticated with *Diagridium*. Nor is *Cinnamon* improved by *Extraction*. Their being more *vigorous* and freed from grosser parts is not *always* a commendation, and *sometimes* it carries danger with it. That those grosser parts, and those natural vehicles are requisite, seems even thence clear, that their *spirits & essences* must be tempered and mixed often with other

Freitag.
Boët. med. c.
75. p. 3. 5.
See Mr. Boyle
of the usefulness
of Philos.
part 2 p. 148.
&c.

See this point
fully debated
in the Vulgar
Errors of
Primrose, f. 4.
c. 2. which I
desire Mr.
Glanvill to
read.
In Pharm.
accp. August.
De CC philo-
sophice calci-
nat. p. 805.

gross bodies before they be given. Those *appendices* of grosser matter are not always *noxious* to Nature, since in our *meats* we find none to be able to live on *Chymical viands*, but good *Kitchen-Preparations*. How many ways are there of preparing *Harts-horn*, yet is there not one that equals the *crude Horn*. I shall set down *Zwelfers* words, whose credit no *Chymist* almost will extenuate. *Licet ex cornibus vel ossibus ita Philosophice calcinatis distillationi subiectis de spiritu sale volatili, & oleo ipsorum foetido nonnihil eliciatur, non tamen propterea existimandum ipsa adhuc iisdem quibus crudum cornu pollere viribus vel majoribus etiam (prout nonnulli sibi imaginantur & asserunt) vel etiam, ut alii arbitrantur, hac calcinatione nihil aliud peractum fuisse quam quod friabilia, ad pulverandum aptiora, & magis pura reddita sunt: Neutiquam, Quippe, qui ambo cornua, tam crudum quam Philosophice calcinatum, examini ignis subiciet, re ipsa deprehendet multum de nativa sua humiditate, de sale volatili & oleo huic cornu Philosophice calcinato detractum esse, & eorundem vix parte quarta adhuc gaudere, ut propterea & hanc calcinationem Phi-*

In prosecution of this point let any man consider, that Chymical oyle of Anniseeds is not so effectual as the powder. Heurn. meth. adv. l. 1. c. 5. Nor doth the like oyle of Camomile equal the infusion, as Simon Pauls Gl. quadrip. p. 255. practically observed. So the common Pillule de succino and Franckfort-pills transcend the minute doses of divers and the most famed Pan-

losophicam, licet totali exustione aliquanto meliorem, approbare nequeam: e contra vero ipsum crudum cervi cornu subtiliter & minutim raspatum pluri assinem, quod tamen diversimode parati,

parari, inque virtutibus suis ex-
altari potest. Ut vel in substantia,
forma nimirum pulveris, vel
in aqua decoctum & in mucilaginem vel gelatinam conversam
tuto & sine nausea propinari possit. Nor is this more
true in Harts-born than in Vipers, which are more effectual
being eaten as Ecce, or by a common infusion in wine, or gi-
ven in powder (plain powder) then when reduced to volatile
Salt and Essences. It is also false, that Chymical preparati-
on always amends, or doth not render some things worse:
The ingredients of sublimated Mercury are not poison; the
result is. How much is the nature of Antimony and Mer-
cury altered by preparing, so that a few grains prove mortal
to the taker, who might without prejudice devour great quan-
tities of either of them unprepared, Hydrargyrus, Antimonium
crudum larga sapius porriguntur: The infusion of crude An-
timony, (a pound in four Gallons of Ale) often rectifies all
impurities of the blood, as well any viper-wine: and Mer-
cury, which being crude is not only given in Pills by sundry
Physicians, but drunk without any hurt in greater or lesser
quantities in several cases. Non desunt qui Mercurium cru-
dum in dolioli fundo detinent, ferunt vinum ne arescat, aut va-
porem contrahat, aut pendulum fiat, ea ratione fieri. Nostale
vinum ad ventris lumbricos plurimum valere certo scimus.
As for the hurtful dregs which the Galenical Medicaments
are said to leave behind: I am confident, that whosoever
shall enquire into the ill consequences of the two Pharma-
ceutics, will say, that if the Galenical be not always the most
efficacious, it is always the most safe and innocent: and any
man will be more apt to dread the violent impressions which
the powerful spirits and minerals may make upon the mem-
branes of the Stomach (which may introduce an irremediable
distemper in the torrens of that part, whereupon depends the
nutriment, health, and vigour of the whole body) then any
noxious fumes or little and remediable hurt from the genera-
lity of the Galenical Medicaments. Qui Deum credit male-
factorum vindicem altoremque, is a noxiis medicamentis, cum
ad manum sunt alia, diligenter abstinebis: ne quando homicidii,

chymagoga. This is an observation common with
all practitioners, that none but Mountebanks and
Quacks can deny it. Crato, Strenghtius, Hofman, and
others, generally taking notice of it.

M. Ruland.
progymn.
Alchym. qu.
33.

Poterium
Pharmacop.
Spagir. l. 1. p.
352. This ex-
periment is
not down in
the two Trea-
tises of the Vi-
tuosi about the
sophistication
of wines: but
in short, those
pieces (as
much as they
are famed be-
fore they
came out)
have been
laughed at by
all knowing
persons and
Wine-coop-
ers.

accusante conscientia, reus fiat, parum profuerit novendecim curasse periculoso curationis genere, quo vigesimus, aut trigesimus sit necatus. *Erastus disp. de propr. medic. c. 65.* And there is this to be said in justification of that Course—that those who have most decried it, and raised their reputo upon a different way, yet have practised with it. In ipsius Paracelsi scriptis passim lamentantur remedia morborum vulgari modo & composita & preparata. Etiam Petrus Severinus teste Paludano, Medicamentis Paracelsici non semper usus est, verum & compositionibus Galenicis saepe. Nor are Paracelsus & Petrus Severinus Danus singular in this action: it is the common usage of Quercetan, Crolius, and Hartman; not to mention Dr. Willis: I shall adde, that Chymical medicines have never or very seldom answered their expectation, which men raise of them: and whosoever shall inquire into the credit

Conring. de med. Herm. c. 21. p. 279. Paludan. epist. ad H. Smet. Ea habetur in Bartholini cista med. in vita Severini. p. 127.

Vide Conring. de med. Herm. c. 21. p. 358 &c. de Paracelsi, de Phedrone, & Pharmacia Paracelsici vide Bernardum Dispenziam Cronenburgium in des med. veter. c. 40, 41, &c. & de Petro Severino Dano. Vide epistolam Paludani, ubi supra. De Scheunemanno vide Ralsinc. chym. l. 1. c. 18. p. 51.

which Paracelsus, Petrus Severinus, Phedro, or Scheunemannus, or Helmont gained by these refined Medicaments, he shall observe that either they are infamous for their destructive courses of Physick, or at best achieved nothing beyond other Mortals, except by Chance. In fine, though I have seen very good success of many Chymical Medicines; yet dare I not express so great an admiration for them as Mr. Glanvill declares: and if he in all the number of his Philosophick friends, had but one understanding Physician, or two, they would tell him, That there are some diseases in themselves, or by accident incurable; that men will die under the most able Physicians, and that the most best and innocent Physick

Nec Paracelsi Rectiores probo, qui medicina degmatica explosa & relicta, Elixir vita, quintas essentias, Axungiam Solis & Lunae, &c. & alia perniciosa & deterius pharma in parva dosi, magno cum supercilio exhibere solent, zgorum palato consilere volentes: cum hoc titulo tenus saltem medicamenta sint, ipsorum quidem opinione singularia, revera autem mortis fereula & pocula, quibus plerumque corpus humanum vehementer exagitur, & magna cum jactatione fatigatur, & ita debilitatur, ut aut rare aut nunquam amplius, pristinas vires recuperet. Gabelchever. Cent. 6. hist. 7. in annot. p. 24.

will sometimes have effects different from the wishes and hopes of the Doctor: and he would finde that by ordinary medicaments not purged from their drags, nor exalted into spirits and essences, as great Cures are done by Country Physicians and

Conn-

Country-Gentlemen oftentimes, as any ever were wrought by Chymistry. The Physick which is celebrated in the Scripture, that which St. Luke, St. James, Cosmas and Damianus, Joannes Damascenus, and others followed, was that which our Divine scruples, at least it leaves *dregs in the body*.

I confess that among the Egyptians, and Arabians, and Paracelsians, and some other Moderns, Chymistry was very fantastick, unintelligible and delusive; and the boasts, vanity, and canting of those Spagyrist brought a scandal upon the Art, and exposed it to suspicion and contempt: but what the Society have done in order to its improvement, I understand not so well as Mr. Glanvill seems to do: the Treatise of Dr. Willis about Fermentation was writ before he was of that number: and I know not how he hath improved Chymistry much since. And in that famed Piece, all is not to be reckoned upon as invented (much

less is improved) that is written. Those that have improved it most, and made it intelligible, are Beguinus, Grollius, Quercetan, Hartman, Angelus Sala, Schroder, Zwelfer, Sennertus, Glauber, and others, that never conversed with the Society; whose Improvements are not mentioned by Mr. Glanvill, though so great, that (considering what men now write or do, is but by their Example, and after they had removed away all difficulties) all that our Inventors have done, doth not deserve to be mentioned.

I shall adde, that we owe not only the invention, and rude improvement of Chymistry to the Disputative followers of Hippocrates, Aristotle, Galen, those superstitious Porers upon the Writings of the Ancients, those ridiculous Schoolmen, and Monks, and Physicians, but even the present credit and esteem which it hath in the world, and upon which it hath so farre advanced it self. It was not Paracelsus with all his *wise and Insolence*, but the Dogmatical Physicians, who observing the benefit thereof in Pharmacy gave it fame, and introduced

His notion of Fermentation, as thereby he expresseth the natural and preternatural occurrences in our bodies, is taken from Bellich. de fermentat. lect. 8. His notion of the fire in the heart is very near related to the doctrine of Conringius de calido innato; and the comparison of the blood with wine is derived from Carolus Pilo: for that those things (which are the principal in his book) seem rather illustrated excellently well, then new discoveries and Hypotheses.

Crato medi-
cina. ep 137.

Eraſt. adv.

Paracelſ.
part. 4 p. 285.
& de metall.
p. 8.

Sennert de
conf. chym.
6. 2.

roduced it into the *Shops*, and *Cabinets of Princes*, and the use of *serious and considerate Persons*. *Crato* introduced it into the *Emperours Court at Vienna*: not a *Chymical Oyle*, or *Extract* was prepared there, till he gave *Encouragement* to the thing. So did *Eraſtus*, a greater enemy to *Paracelsus* than to *Chymical Physick*: as appears by that saying which he uttered in the midst of his *Disputes* and animosities against the *Paracelsians*. *Equidem ne absoluta est Ars nostra sine distillatoria*. And had not *Langius*, *Audernacus*, *Gesnerus*, *Fernelius*, *Zwingerus*, *Schegkius*, *Augenius*, *Minadous*, *Matthiolus*, *Libavius*, and many other *Physicians* of the *Hippocratical* way introduced the *sober and honest practice* of it, and rendered it *helpful to common life*, perhaps our *Virtuosi* had never medled with it, at least not have been able to give it any esteem in the world. But now that the *Galenists* and *Aristoteleans*, (as they are commonly called,) have refined it from its *dross*, and cast off the *Chrysopoietick* and *delusory designs*, and *magical intermixtures*, and *Rosicrucian vapours* and *superstitions*, all which they effected; and gave *Mr. Glanvill* the opportunity of this *Cant*, with which I conclude this discourse.

Mr. Glanvill,
p. 12.

"I confess, Sir, that among the *Egyptians*, and *Arabians*,
"and *Paracelsians*, and some other *Moderns*, *Chymistry* was
"very phantastick, and unintelligible, and delusive: and the
"boasts, vanity, and cantings of those *Spagyrist*s brought a
"Scandal upon the Art, and exposed it to suspicion and con-
"tempt. But its late *Cultivators*, and particularly the *ROY-*
"ALL SOCIETY have refined it from its dross, and made it
"honest, sober, and intelligible, an excellent Interpreter
"to Philosophy, and help to common life. For they have laid
"aside the *Chrysopoietick*, and delusory designs, and vain
"transmutations, and *Rosicrucian vapors*, *Magical Charms*
"and *superstitious suggestions*, and formed it into an instru-
"ment to know the *Depths* and *Efficacies of Nature*. — All
"this without dispute the Society hath done; and without dispu-
"ting. And hereupon I do agree with our *Virtuoso*, that they
"have no small advantage above the old *Philosophers* of the *No-*
"tional way.

Perhaps not so
delusory as
Mr. Glanvill
thinks: but I
am sure the
projects some
go upon are
delusory,
have much of
the *Rosicru-*
an humour in
them: and
the design of
introducing a
sensible Phi-
losophy is the
pretence of
Crollius, and
of the *Rosi-*
crucive Order.

Of Anatomical Improvements.

“VV E have another advantage above the Ancients in
 “the study, use, and vast Improvements of Ana- Plumier’s
p. 12.
 “tomy, which we find as needful to be known a-
 “mong us, as ’tis wonderful ’twas known so little among the
 “Ancients, whom a fond Superstition deterr’d from dissecti-
 “ons. For the Anatomising the bodies of men was counted
 “barbarous and inhumane in elder Times: And I observe
 “from a learned man of our own, that the Romans held it
 “unlawful to look on the Entrails. And Tertullian severely
 “censures an inquisitive Physician of his time for this pra-
 “ctice, saying, That he hated man, that he might know him.
 “Yea, one of the Popes (I take it ’twas Boniface 8.) threatens
 “to excommunicate those that should do any thing of this
 “then-abominable nature. And Democritus was fain to ex-
 “cuse his dissection of Beasts, even to the great Hippocrates.
 “Nor does it appear by any thing extant in the writings of Ga-
 “len, that that other Father of Physicians ever made any
 “Anatomy of humane bodier. Thus shy and unacquainted was
 “Antiquity with this excellent Art, which is one of the most
 “useful in humane life, and tends mightily to the eviscerating
 “of Nature, and disclosure of the Springs of its Mo-
 “tion.

I have set down without any interruption the words of
 this English Bravo and Hector of our Modern Philosophers,
 that my Reader might come with a greater expectation to
 the perusal of my *Animadversions*: so high a charge of ig-
 norance upon the Ancients, such useful discoveries of the
 Moderns render the former to be contemptible fellows.

K

and

and the latter a very *beneficial* and *important* party in this *Age*. But if it do appear that the *Moderns* have not as yet convinced us by their *works* and *great performances* in *Physick*, that the knowledge of these *new inventions* is so necessary to *Physicians*, and so *advantageous* to *mankind*, but that those which either *sight* or *ignore* their *discoveries*, acquire a greater *repute*, are *more* employed and possessed of a *more honourable* and *gainful practice*, and, in fine, do *greater Cures* in general, then our *Braggadochios*; then is there no such reason for this *Triumph* of *Mr. Glanvill*, as he imagines. The better to judge hercof, I desire all considering men to look back upon the several *Physicians*, who have flourished in *Greece*, *Rome* and *Barbary*, and to view the present state of *Physick* in *Italy*, *Spain*, and *France*, and try his most *severe judgement* if it be possible for him to condemn that *Physick* as *imperfect* and *pitifully deficient*, which gave that credit to *Hippocrates*, *Galen*, *Rhases*, *Avicenne*, *Fernelius*, *Lacuna*, *Alexatus*, *Valladius*, *Christophorus*, and *Thomas a Veiga*, *Claudianus*, *Massarius*, *Septalius*, *Rondeletius*, *Hollerius*, *Ballonius*, *Rodericus a Castro*, *Fonseca*, *Saxonia*, *Sennertius*, *Crato*, *Prosper Alpinus*, *Antonius Musa*, *Basavola*, *Hofman*, and many others whom I shall not name; as indeed I name these without any order) which they now enjoy. Let him set his most *ambitious thoughts* on work, and see if he can propose to his *desires* greater things then they attained unto, and achieved. Let him employ all his *envy*, and yet condemn their *Diagnosticks*, *Prognosticks*, or that *Secretorum Secretissimum*, their *method of curing*, and their *Medicines*. If there be *little* or *no fault* in these parts, it signifies not much what *principles* they went upon in *Philosophy*, nor whether they did *mistake* or *ignore* some things in *Anatomy*, as long as they were not such as hindred a *Physician* from the obtaining of that end which is designed by his *Art*: And as to the improvement of the *Therapeutick* part of *Physick*, by *new Medicaments*, or *new* and *more pleasant* preparations of *old Medicaments*, if they be *no more efficacious* then the former, we pay to the *Inventors* those acknowledgements, which we do to the *introducers* of *new garbs* and *fashions of clother*, the best

best contrivances whereof, howsoever they may excel in convenience, cannot be endeared unto us by the representations of being necessary. I have named *practical Physicians*; I shall now instance in *Chirurgery*: What man is there in this Age, that would not be content with the repute of *Ingrassias, Vesalius, Fallopius, Carcanus, Aquapendens, Spigelius, Marchettis, Severinus Paraus, Chalmetaus, Pigras, Guillemeau, Hildanus, &c?* or what man is there in this *inquisitive Age*, that any sober man would compare with *them*, much less prefer before *them*? If the Posture of *Physick* be such, and that the value we ought to place on every thing be to be regulated by its *subserviency* and *conduciveness* to some end, (*finis conciliat mediis gratiam*) it is easie to judge what *certain esteems* we are to put upon the *modern Improvements of Knowledge* in order to *Physick*, and how far we may justly censure the *Ancients*, and such as either *sight* or are ignorant of *them*. I profess my self not to know what *dis-ease* it is that the *Virtuosi* cure better, or with more certainty than those that follow those other of the *Dogmatical way*. If it were *dane*, there would not want such as should cry such performances up; besides the interest of the *Novellists*, the sence of their *great Cures*, would gain them all the practice that is now in the hands of such as vary not from the *ancient Method, and Rules of that Art*. I shall adde, that I could demonstrate by *undeniable testimonies*, and such as are confirmed by *modern trials*, that the introducing of *new Medicines*, either *Chymical*, or otherwise, and the neglect of a *diffused reading*, hath occasioned the *dis-use* and ignorance of several *Medicines* for *Consumptions, the Gout, Plague, and other grievous diseases*, which might be attempted with much more *assurance*, then is to be placed upon the *later Methods*. To prosecute this point further, I shall tell you, that *Physicians* hitherto looked with a great *indifference* upon the *Principles of natural Philosophy*, whether they were *true*, or *no*; so that they did but serve as convenient *Memorials* to regulate them in their *practice*, and that they did guide them to their wished end with *such certainty*, as if they were *true*. All *disputes* about *Natural Philosophy* that did not refer to

practice, they looked upon as *Curiosities*, going beyond their *Art*, and about which they would not contend, so as that the *Method of curing* were not undermined thereby. Upon this account they did allow of two sorts of *Truth*, the one in *Physick*, the other in *Natural Philosophy*, and that what was *such* in one, might not be *such* in the other. This *President* they derived from their great Master, *Hippocrates*, who in his discourses sometimes proceeds upon the *Doctrine of the four Elements*, as if that were *true*: Sometimes he goes upon the *doctrine of Atomes*, as if he regulated his *Cures* thereby: sometimes he seems to favour the *Tenets* of the *Chymists*; and he cries out as *Mr. Boyle*, and other *Chymists* cite him, *Non calidum, frigidum, humidum, siccum esse quod maximam vim agendi habet in corpore, verum amarum, & salsum, & dulce, & acidum, &c.* Sometimes he proceeds as it were upon the principles of the old *Methodists*, and ascribes the origin of diseases to the altering of the texture of the body, to the different conformation of parts, the different configuration of pores, &c. This was the course that *Great Man* took: he was willing to observe in all diseases the motions and the course *Nature* took; to take those for *ill signs* and *symptoms*, which he found to be such from that great *Instructor*; however ἀπαίδευτο. & βυαδύσα, those ways whereby *Nature* did usually terminate diseases, were the ways he thought they ought to be terminated by; and he made that the scope to be aimed at in the curing of diseases: those evacuations that had helped naturally to cure, he endeavoured to promote artificially, by such Medicines as *Experience* shewed to be serviceable to those ends, when administered at due times and seasons. In short, he made himself absolutely the slave of *Nature*, attended on her motions, sometimes gently leading her on, as it were a *Gentleman-Usher*; sometimes following her, as a *Page*, never pretending to command her by his Medicines: So cautious he was, that he would not adventure to do good unseasonably, and at other hours than his *Teacher* directed him, lest he should do harm: he would not adventure to shorten a disease, lest he should shorten his *Patients* life. As if he had foreseen the truth of that observation, which *Vallesius*, and others in these days experiment, *Celerior quam*

See Otto Tachenius's
Hippocrates
red vivus et
his Clavis Ne-
d c. Hippoc.
De vet. medic.
§ 4 Concern-
ing the me-
ning of whi h
Maie see E. 4
Hus ad v. Pa-
rac. p. 1. pag.
55 & Con-
ring. de Her-
met. medic.
16 p 191.

quam pro morbi longitudine curatio, detrahens plus virium quam pro morbi ratione facti in tempore curandos ante tempus mori.

Agreeable to this Method of Hippocrates, was that counsel which Dr. Bathurst (of Black-friers) gave me, when I first seriously set my self to study and observe his practice in *Physick*, viz. *Nunquam ille Medicus magnus erit, quisquis patitur sese principiis Philosophicis alligari atque constringi.* It is impossible for any person to be a great *Physician*, who ties up himself to one sort of *Natural Philosophy*, as if it were really true and certain: the operation of Medicaments is oftentimes such as answers not the Principles of any *Philosophy*, and the digestions of *Nature* are so different from those of *Chymistry*, her fires, her solvents, her filters, her furnaces & vessels, her mixtures and degrees of heat so discrepant, that there is no arguing from the one to the other: nor is there any thing to be relied upon in *Physick*, but an exact knowledge of medicinal *Physiology* (founded upon observation, not principles) *semiotics*, method of curing, and tried, (not *excogitated*, not *commanding*) medicines: where this course fails (as sometimes it will) we then try uncertain Medicines, rather than abandon the Patient to those *Prognosticks*, which are seldom so fatal as to destroy all hope; and where Skill is at a loss, we frequently behold Chance to be successful. And this last is the *Mystress* of our *Reforming Physicians*, it is under her conduct that they will enrich our *Therapeutick* part of *Medicine*, and alter our *Method*. I shal not enlarge further here upon, being content to have shewed what esteem *Physicians* have had *Philosophy* in, and how they have had as little regard to the truth of their principles in *natural Philosophy*, as a man ought to have to the hand of a *Dial*, or which points out the way to any place: It is not requisite that it be a real hand, whatever men call it; nor would we endure the impertinencies of any that should go about to perswade us out of our way, because they that cald that an hand, were mistaken: In sum, so the way be good and certain, I am content to be one of those whom the *Italian Proverb* commends, for going that way which the *Mules* go. *Ita quæ Muli eunt.* In this opinion I have amongst late Writers the learned *Hofman*, whose words are these, *Quæ enim necessitas est Medicum semper loqui cum Physico, siquidem usus, a quo pendet ars nostra, aliud velit, vel certe permittat? Quid enim ibi VERITAS est, hic UTILITAS est.*

Consultus esse nullus nescit tempore paulo longiore & turbari, quam paulo breviori cum certo vitæ periculo sanari. Erasmus disput. de propriis. med. c. 69. sub finem.

Instit. med. l. 2 c. 7 sect. 11, 1, & c. & Ad 2. sect. c. 1.

Not

Jo Ant. Van-
der Linden
de circuitu
sanguinis exer-
cit. a. sub signem.

Nor will it be amiss to propose the Judgment of the learn-
ed Practitioner *Joannes Antonides Vander Linden*, which he
passed not long before his death at *Leiden* A.D. 1659 after
a mature consideration of all the new speculations in *Natural*
Philosophy, which this last Age had produced and acquaint-
ed him with. "*Physici ab imaginariis incipiunt, per ratio-*
"*cinia pergunt, & in frivola desinunt. Cordatos obtestor, an*
"*apud se non πᾶν ὑπόληψιν? Ad quid igitur Physica, ut nunc*
"*constituta est, Medico? Etiam quæ nunc docetur optima*
"*(præter quod Principiis nitatur non necessariis, & ob id*
"*certa non sit) quid ad medendum, si scitur, utile; aut, si*
"*nescitur, noxii confert? Etiam, si extaret, quæ absolute cer-*
"*tis principiis & perfectis regulis constaret, tamen Medicinæ*
"*non esset, nisi Institoria, non Institutoria. Institoria, in-*
"*quam; nam id Medicis est Physica, quod Fabris omne ge-*
"*nus taberna mercium Novicarum. Instituriam Medicina*
"*qui volunt, nã illi sciunt, quid velit detritissimum, ubi de-*
"*finit Phycus, ibi incipit Medicus. Medicina non habet*
"*opus aliena; nedum a Phycis ficta & emendicata prin-*
"*cipia: habet sua, & certa, & ausa stare contra omnem du-*
"*bitationis impetum. Quæ fiducia concludo: Physica ho-*
"*dierna optima Medicinæ parum aut nihil utilis est. Qui*
"*habet aures ad audiendum audiat, mentemque sanam in*
"*corpore sano habeat. Saltem vos, vos æterum alloquor χαρί-*
"*ς ατοι παῖδες, sapite; & ab ea quæ Medicinæ larva se tegit,*
"*Physica cavete; & hoc agite, ut quam aliquando salutis hu-*
"*mana præsidem Artem in bona conscientia vultis facere, eam*
"*ante cum certo fructu regia via velitis discere.*

Upon this account I often laugh at our modern *Virtuosi*,
when they dilate themselves with a great deal of ostentation
and confidence, about the qualities and correctives of *Opium*,
whether it be hot or cold? which controversie how great so-
ever, hath no influence upon practice, because both agree
pretty well in the cases in which it is to be used, and many
of the modern preparations and corrections are foolish, and
make it worse; And as to that *Laudanum* of *Helmonts* a-
mongst the *Virtuosi*; I have seen much more simple prepara-
tions stupifie less, and produce greater Cures, then that did
when

when made by the hands of one of the Society, and given by another of it: whilst the best of *Modern Chymists*, *Zwelfer*, bestows this commendation upon that old medicine of *Archigenes* and *Mesues*—*Erit sic rite praparata opiata, qua merito Laudani opiati, multarumque aliarum Opiatarum vices supplere posses.* I could enlarge here, but that Mr. *Glanvill* will think I have forgot him.

*Pharmacop.
August in
conf. Archi-
genia.*

Having made this general *Apology* for *Physicians*, which is sufficient to justify them, both as to their care of their *Patients*, and their skill; I shall come to apply my discourse particularly to Mr. *Glanvill*. It is hard to reconcile the necessity of *Anatomy*, with the *Mosaical Constitutions*, it seeming strange that God should make it so unclean a thing for any one to touch a dead body, and yet the knowledge of *Skeletons* should be so necessary. To supply this, the *Jewish Rabbins* say, that God *Almighty* did reveal unto *Moses* the accurate knowledge of *Anatomy*: and when we consider how they embalmed their dead, and that embalming doth infer a knowledge of dissection, and of the *Entrails*; when we observe (out of *Buxtorfs Synagoga*) that artifice with which the *Jews* kill all *Animals*, thereby to let out the blood exactly: when we consider that the multiplicity of accidents in war, or otherwise, would render the knowledge of the inward and outward parts necessary to them, and experience acquaint them with their nature (not to mention some *Jewish* relations about the opening of the *Os pubis* and the *partus Caesareus*) I am apt to think that the ancient *Jews* were not ignorant of useful *Anatomy*, nor so superstitious as totally to avoid the practice of it; nor dare I say (with our *Virtuoso*) such Superstition is fond, which is ascribed to God as its immediate Author.

*Vid. Rio'an.
Anthropo-
gr. ph. l. 1. c. 3.*

As for the *Greeks*, the study of *Anatomy* was very ancient amongst them, since it is attributed to *Nemæon*, that ancient *Physician* (a Scholar of *Pythagoras*) as the first Author of it, if we will believe *Chalcidius* upon the *Timaus* of *Plato*. From him it was derived to posterity by tradition and manual operation, children being bred up unto it, such as were to be *Physicians*, as also *Philosophers*. So *Democritus*, *Hippocrates*,

tes, and many others came to be acquainted with it: But none of the *Ancients*, until the time of *Diocles Garysius*, did write any thing about it: which notwithstanding, that Sci-

The Anatomical operations of the Youth were called by Xenophanes ἀνατομικά, which Hofman thinks may be rendered simply in a line, Exercitia Anatomica. Adling. Didiceram enim ex eius operis (apud Galenum) l. 2. initio haec by Xenophanes ab ipso artis incubulo fuisse puerorum in tamina Asclepiadea, altissimum ad faciendam medicinam. Sciebam etiam aliunde, longe aliam fuisse tum Anatomiae rationem, quam nunc est, scilicet inquam fuisse traditam historiam partium ipsarum, semperq. fultam oculari inspectione. Vide Hofman Var. L. & l. 2. c. 13. The same is allowed by Velsius in his Preface to Charles V.

ence seems to have been in never the worse condition, as *Mercurialis* thinks. *Anatomen etsi a nullo veterum usque ad Dioclis aetatem Scriptis mandata referat Galen. in 2. de anat. admin. melius tamen sic conservatam & amplificatam inde intelligere possumus, quod tunc homines a primis annis Anatomem*

(ut ceteras artes,) non ex scriptis sed ex Parentum sermonibus ipsaque exercitatione addiscebant; sicque melius ipsam comparantes, non modo tenacius in animis servabant, verum etiam assiduis studiis agebant. But to put this question more out of doubt, I shall appeal to *Galen*, who could give a better account of what they did in the elder times than Mr. *Glanvill*. I have not his Works by me; but *Lacuna* in his *Epitome* thus expresseth him. "Quod veteres nihil scripserint de confectionibus administrandis, vertendum illis visio non est: quandoquidem erat iis tum frequens tamque in communi usu ipsa Anatomie, ut domi apud Parentes etiam ab ipsa pueritia, in illa omnes olim exercerentur. Postea vero tam praclaro illo exercitio intermisso, opus certe nobis fuit Commentariis, qua Anatomicam disciplinam Chirurgica medendi rationi maxime necessariam, integram conservarent. That Aristotle did dissect the bodies of men is manifest out of his *Hist. Anim.* l. 3. where he informs us how he made an inquiry into the nature and series of the veins in humane bodies: and as to his anatomizing

of other creatures, beasts, birds, fishes, insects, (and how he had some thousands employed under him to that purpose) no man can doubt who reads *Roslanus* and

Pliny l. 8. c. 18. How accurate he was (however his brevity doth not represent every circumstance, nor fully describe things)

*Nature Epit.
Galen de ana-
tom. admin.
l. 2.*

*Vide Roslan.
Anat. p.
graph. l. 4.*

I would not be understood to justify every passage in Aristotle relating to Anatomy: he hath many gross errors opere in longo: but have not also Harvey, Highmore, Sylvius, and others, so many as may excuse his incoherence sometimes?

we may judge by this that there are few of the *new inventions*, but are ascribed unto him; and Dr. *Harvey* is known commonly to have said, *Nihil fere unquam in ipsis Natura penetrabilibus invenisse se, quin cum Aristotelem suum pensiculatus evolveret idem ab illo, aut explicatum, aut saltem cognitum reperiret.* After *Diocles*, I find these other reckoned as notable Anatomists by *Volcherus*, *Coiter*, viz. *Polybius*, *Erasistratus*, *Callistus*, all Scholars of *Aristotle*: And after them *Marinus*, and *Lycus*, the Master of *Galen*, and *Satyrus*, and *Pelops*, and *Numesianus*, besides several others at *Alexandria* all which *Galen* went to converse with. But I must not pass by *Herophilus* without an especial Character, who did not only correct the mistakes in *Anatomy* which his Master *Praxagoras* fell into, but by his industry and skill acquired a repute so great, that his name is equal to the most famous that ever were before, or since his time: This great man is preferred by *Vesalius* before *Galen*: And it was an usual saying of *Fallopins*, that any man might as easily contradict the Gospel, as contradict *Herophilus* in Anatomy. *Contradicere Herophilo in Anatomicum est contradicere Evangelio.* This man is that inquisitive Physician, of whom Mr. *Glanvill* speaks, and who is blamed by *Tertullian* not for dissecting humane bodies, but for dissecting them alive, which he terms *Butchery*. Because, I think Mr. *Glanvill* never read him, and because I will make it evident that one of the Ancients did dissect more bodies of men, then all the Society put together, and that with an extraordinary caution. I shall set down the words of *Tertullian*, and they are these, — *Herophilus ille Medicus aut Lanius, qui sexcentos eexecuit ut naturam scrutaretur, qui hominem odit ut nosset, nescio an omnia ejus interna liquido exploravit; ipsa morte mutante q̄ quævixerant, & morte non simplici, sed ipsa inter artificia executionis errante.* Upon which passage, *Philipp le prieur* notes thus, *Anatomia quæ & celebris magnoque in precio fuit apud Ethnicos, a veteribus Christianis odio quam maximo afficiebatur. Quamvis hic dictum Lanium Herophilum constet, quod vivos homines dissecaret. Id autem facere solitos Erasistratum, Dioclem, & Herophilum docet Claudius Galennus 8. de plac. & 2. anatom. administ.* Agreeable to

Dr. Pearson
Dedic. Laert.
iii ad Car.
vol. II.

Vol. Coiter in-
tro. in anat. c. 6
Galen in his
Comments upon
Hippocrates
de nar. hum.
reckons up a-
bout 20 emi-
nent Anato-
mists of the
ancients.
Vide Riolan.
Anthropogr.

Mazius fun-
dam med. c. 1.
p. 10. & Vossius
de phil. c.
11. sect. 2.

Test. Eian. de
anima c. 10.
Gagnam.
Mercurialis,
& Vossius real-
it. se singulis
excecut.

Celsus l. 1. in
praefatio.

of *Tertullian*, is that passage of *Cornelius Celsus* in his Preface. *Neceſſarium ergo eſſe incidere corpora mortuorum, eorumq; viſcera atque inteſtina ſcrutari, longeque optime feciſſe Herophilum & Eraſiſtratum, qui nocentes homines a regibus ex carcere acceptos, vivos inciderint, conſiderarintque etiam Spiritu remanente, ea quæ Natura clauſiſſet, eorumque poſituram, colorem, figuram, magnitudinem, ordinem, duriciem, molliciem, laxorem, contactum: proceſſus deinde ſingulorum & reſeſſus, & ſive quid inferitur a teri, ſive quid partem a terius in ſe recipit.* This *Herophilus* was undoubtedly a perſon of vaſt parts, great earning and curioſity. He brought the *Hippocratica* Phyſick to its height and perfection, compleating the *Anatomica* part, and illuſtrating the Doctrine of the *Pulſes*. His followers had a *School* not far from *Laodicea*, as *Strabo* ſaith, wherein it is not to be doubted but that *Anatomy* was taught, and ſo in that other School of *Eraſiſtratus* at *Smyrna*. Μεταξὺ δὲ τῆς

Strabo Geograph. in fine
lib. 12. citante
Mercuriale
Var. 1. c. 1. l. 2.
c. 12.

Λαοδικείας καὶ Καρχήρων ἱερὸν ἐστὶ μνηδὶς Κάρυ λαλόμενον. Τιμώμε-
ρον ἀξιολύτως. Συνέστηκε δὲ καὶ ἡμᾶς διδασκαλεῖον Ἡεροφιλείων
ἰατρῶν μέγα ὑπὸ Σεύξιδος, καὶ μετὰ ταῦτα Ἀλεξάνδρου τοῦ φιλα-
λήθους καθάπερ ἐπὶ τῶν πατέρων τῶν ἡμετέρων ἐν Σμύρνῃ τὸ τῶν
Ἑρασιστράτειων ὑπὸ Ἰκασίου. From whence it is clear, that in
the Reign of *Augustus Caesar* (when *Strabo* lived) *Anatomy*
in the Eaſt was in great requeſt, and that the *Physicians*
and followers of *Herophilus* had a great *Academy* betwixt
Laodicea and *Garura*. And that before thoſe times at *Smyr-
na*, *Eraſiſtratus* that was a great *Diſſector* of men (even a-
live) had another *Academy* of his followers: whoſe works
though they are loſt, yet *Vesalius* ſaith, that one may con-
jecture out of the paſſages in *Galen* that relate to them,
that they were very accurate *Anatomists*. — *Veteri-*

Vesalius de
rad. China, p.
158.

*bis diſſectionum proceribus, quos ex Galeni libri in corporum
anatomie ſedulo verſatus eſſe nobis perſuaſum eſt.* — Not much
unlike this character of *Vesalius* is that Elogy which *Veslin-*
gius beſtows upon the Ancients in an Epiſtle of his to *C. Hof-*
man, enquiring whether the *vena lactea* of *Aſellius* were a
part of the *porta vena* known ſo long ago? Sic habeas, incertum
mihi eſſe quid primi illi qui ante *Dioclis Garyſtii ævum privatis*
affectionibus in corporis humani partes inquirebant hic viderint,

cum

cum nihil eorum quæ cognorant scriptis divulgant. Vixere fortes ante Agamemnona multi, ait Lyricus: & proculdubio ante Herophilum eximii, & in hoc dissectionum studio exercitissimi, quos ob monumentorum defectum longa nocte oblivio premit. Vellingius Ep. 20. edit. per Bartholin.

I shall conclude this discourse of *Herophilus*, with an observation about the time when he lived; which was not in the days of *Tertullian*, though *Mr. Glanvill* represents them as *Contemporaries*: but many Centuries before, in the time of *Ptolemaus Philadelphus*, and he is famed for his raillery upon *Diodorus Cronus*, who denied there was any motion, yet had his shoulder dislocated. See *Conring. de medic. Hermet. c. 9. p. 83.* Some make him more ancient, but none ever brought him so low as our *Virtuoso*. Vide *Voss. de Philos. c. 11. Fonsium de Script. Philos. l. 1. c. 15.*

As to the *Romans*, and their skill in *Anatomy*, I cannot say much of it, except it be to their disparagement. They were a military sort of people, rough-bewen, and thought all that below their studies or serious thoughts, which our *Experimental Philosophers* boast of, and recommend unto our care with so much vanity. All the *Mechanick*, I had almost said (the *Liberal Sciences*, they thought to be excellent qualifications in their slaves, not in themselves: And they who gave Laws to all the world, scorned to be instructed by their vassals, and a conquered Nation. Upon this account, not onely in the time of *Tully*, but afterwards to the days of *Quintilian* and *Tacitus*, (I know not which writ the Book *De Oratoribus*) it is evident, that however many Gentlemen did inform themselves of the several parts of ingenious Learning, yet did that haughty people behold those persons with indignation, and some thoughts of hatred, in so much as that those who were best versed in it, pretended ignorance and scorn of it. Things being in this condition, and the *Romans* having no other Physicians then their Slaves, it is not to be wondered if they were not eminent for *Anatomy*. *Cato* had banished the Physicians long ago, and after-ages gave them little encouragement.

I do not at present remember any *Physician*, whose name hath any thing of the *Roman* till *Cornelius Celsus*, and after him *Veëtius Valens*. *Pliny* saith, that even to his time, in the reign of *Titus Vespasian*, the *Romans* did not care to profess and practise *Physick*. *Solam hanc artium Græcorum nondum exercet Romana gravitas in tanto fructu: paucissimi Quiritum attingere, & ipsi statim ad Græcos transfuga: imo vero autoritas aliter quam Græce eam tractantibus, etiam apud imperitos expertesque linguae, non est.* *Nat. hist. l. 29. c. 1.* In the time of *Augustus Caesar*, his freed man *Artorius Musa*, and his brother *Euphorbus* gave some credit to *Physick*, and afterwards several eminent *Greeks* are said to have flourished; but whether it were that the *Romans* were impatient to learn so much as was requisite (or thought to be so) to make a man eminent in the *Hippocratical* and *Herophilian* way; or whether they thought it more becoming their grandeur, rather to learn (with all the world) a new *Method of Physick*, then seem to have been so long as it were brutish and ignorant in

Ideo deſerta
ſi hæc diſci-
plina quæ
eſſe et in
caſtreſis ſci-
to. *Pliny.*

During the flourishing of the *Roman Empire*, the study of *Physick* was principally pursued at *Alexandria* in *Egypt*. There *Herophilus* and his Scholars had given it credit, and the *Empiricks* and *Methodists* had their Academies, and the *Jatroſophiſts* were endowed professors. The repute of *Alexandria* being ſuch even in the days of *Valentinian*, that it was credit enough for any *Physician* to ſay he had been bred there. *Ammian. Marcell. lib. 22.*

comparison of the *Greeks*; or whether that the new principles and method were more agreeable to that *Empirical* way, they had been accustomed unto (See *Plin. nat. hist. l. 26. c. 3.*) and so more easily received by the populace then that of *Hip-*

pocrates made up of a *Grecian* dyet, and medicaments; whatever was the reason, I finde that the *Romans* did generally incline to that Sect of *Physicians*, called the *Methodici*, begun by *Aſclepiades* and *Themison* in the time of the *Triumvirate*, or *Veëtius Valens*, and compleated by *Theſſalus* in the time of *Nero*: This Sect seems to have had the advantage over all other the *Physicians* amongst the *Romans* from the time of *Augustus*, to the reign of *Severus*, which is near three hundred years. *Pliny* calls *Themison*, *Summum authorem*, and by that place in *Juvenal* one would gueſs him to have been a man of great notice and general practice in the days he lived.

Plin. l. 14. c. 17.

Mor-

*Morborum omne genus, quorum si nomine queras,
Promptius expediam quot amaverit Hippia mœchos,
Quot Themison agros autumnno occiderit uno.*

Theſſalus, against whom *Galen* and *Pliny* inveigh, was certainly a man, not only of great *Eloquence*, but also of extraordinary *Learning* and *Judgement*, as we may guess by those parcels and fragments of that excellent man, which are all that remains of him, and they preserved in the works of others. His Books *de Communitatibus & Syncriticis* are peeces whose losses I much lament. The Memory of his *Tombe* is not lost upon which he inscribed himself, *ιατρονικον*; or, *The Conquerour of Physicians*. His Letter to *Nero* had something of a gallant confidence in it, which may become *Heroes*, and is justified in men of great *Learning*. Cum novam sectam condiderim, & qua sola vera sit, propterea quod qui ante me fuerunt omnes nihil utile prodiderunt, vel ad sanitatem tuendam, vel ad morbos propulsandos---. The generality of his followers seem to have been excellent *Physicians*, as *Dionysius*, *Proculus*, *Archigenes*, *Soranus*, *Attalus*, *Julianus*, and others. I shall not insist upon a particular relation of their tenets, which one may see excellently illustrated by *Prosper Alpinus*. Prosper Alpin. de medic. methodica. This sect of *Physicians* seems to have left impressions of its method and principles, in all places where the *Roman Empire* swayed. They placed little value upon the exact knowledge of *Anatomy*, being content with a general skill therein, and enquiring no further than was necessary. They knew that the *Romans* had formerly banished the *Physicians* (as *Archagathus*) from amongst them, for using their *Patients* with much cruelty, cutting and burning them; and understood the humour of the people so well, how they disliked the dissections of humane bodies.

Quintilian being to describe *Physick*, renders an account of it agreeable to the *Methodists*. In declam. 8. *Gemini Languentes*.

They called *Gallen*, when he put himself forth in the world by the ostentation of *Anatomy* and *Philosophy*, *Logiater*: *Logiatri* autem nomen sui temporis medici Romæ *Galen*o per contemptum imponebant; ut ita eum traducerent, quasi non reipsa, nec usu, & exercitio artis peritus esset: Sed ad loquacitatem duntaxat & differendum de iis quæ ad artem pertinent comparatus. *Gesner*, in *Scholiis ad Cassium* p. 57.

bodies, especially alive; and therefore they closed with that popular prejudice, and turned it to their advantage; neither dissecting of bodies, nor tormenting them with those odious or cruel methods of Cure, which were practised by the followers of Hierophilus. Nor do I doubt that those objections in Celsus against Anatomy, were put into his mouth by the Methodists, as well as Empirics, viz. that all Anatomy of bodies was a nasty performance; but to dissect the living, most barbarous and cruel: that as much of Anatomy as would instruct one sufficiently, might be learned in a Camp, where the Physician need not make wounds, but learn at once and practice Cures. Hence it was that the study of Anatomy was so much out of request at Rome in Galens time, that I think he mentions not one curious Anatomist there, though he tell how Satyrus taught him at Pergamus, and Pelops at Smyrna, and Numesianus at Corinth, and others. There were some that were excellent Ostrologists at Alexandria. And I am apt to think, that even he durst not for fear of publick odium, dissect any living men there, because, as Celsus saith, most people held it to be cruelty, and perhaps would not have thought well of him, who should have dissected any dead men.

Whereupon he set up with Apes, dissecting them, as being nearest to men in resemblance, and imagining the fabrick of their bodies to have as great an affinity with the parts of men, as their shapes had; that this was the cause of many mistakes in him, is certain; and demonstrated by Vesalius.

But that he never made any Anatomies of humane bodies, or considered any as they came in his way, is a calumny which might be refuted by sundry instances out of his Works, and some thereof are to be seen in Riolanus Anthopogr. l. i. c. 12.

Vesalius never raised his imputations to this heighth; all that he saith of this nature, is, Nobis modo ex renata dissectionis arte, diligentique Galeni librorum praelectione, & in plerisque locis eorundem non poenitenda restitutione constat, nunquam

Vesalius in his Treatise de rad. Chinæ sheweth how Galen dissected Apes, and was thereby led into sundry mistakes. But even such as did blame Galen were themselves faulty, as Vesalius and Columbus; which appears by what they say about the kidneys; which they describe out of brutes, not men, as Piccolominius and Beverovicus observe. Beverovic. de calculo, p. 3. Read also Fallopius Observations

Vesalius in dedic. lib. de fabric. corp. hum. ad Carol. V. Imper. In the same place he calls Galen. dissectionis professorum facile primarium.

quam ipsum nuper mortuum corpus humanum rescuisse. At vero sui deceptum Simiis (licet ipsi arida, ac veluti ad offum inspectionem parata hominum cadavera occurrerint) crebro veteres Medicos, qui hominum confectionibus se exercuerant, immerito arguere. Nay, it is evident out of *Galen*, that the Roman Physicians which were in the Army of *Antoninus* did dissect the Germans that were killed by him in batel. As for that Learned man of our own, out of whom he tells us, That the Romans held it unlawful to look on the Entrails: I know not who it should be. Mr. Boyle indeed doth say, that in *Galen's* time it was thought little less then irreligious, if not barbarous, to mangle the bodies of men: which how far it is true, one may guess out of what I have said; But that Honourable Person speaks in such a manner as gives us little of exception; Mr. *Glanvill* is so peremptory, that I wonder that he did not deny, that the Romans did not use any Augury from the inspection of the bowels, heart, and liver of beasts; or that they did not eat the Livers of Geese, and other Guts of several Animals. This is so well known to every School-boy that hath read *Martial*, or *Horace*, or *Virgil*, that I need not speak of it. Had the Romans held it so unlawful a thing to behold the Entrails of Animals, I wonder they gave the name of *Visceratio* to those distributions of flesh which they publickly used: to such unlawful customs, *Virgil* would not have alluded, when he brings in *Dido* her self,

— *Pecudumque reclusis*

Pectoribus inhians, spirantia consulit exta. *Æneid*. l. 4. v. 64. & *Georgic*. l. 1. v. 484.

Tristibus aut Extis fibra apparere minaces.

Nay, they carried the bodies of beasts open with their Entrails displayed to be sold publickly, as *Mart.* shews l. 6. ep. 64.

Ne valeam, si non multo sapit altius istud,

Quod cum panticibus laxis, & cum pede grandi

Et rubro palmone vetus, nasisque timendum,

Omnia crudelis Lanius, per compita portat.

But perhaps he will confine his discourse to the Entrails of men, why then did not he speak more plainly? And even in this case, that some superstitious persons might hold it impious and unlawful is possible:

and

Galen. l. 3. sec.
gen. c. 2.

I believe that
place in Pliny
relates only
to Augustus,
that it was
not lawful a-
mongst men to
make use of
humane bo-
dies, and
search their
bowels to
those ends:
this was ne-
fas: but no-
thing else.

and that others out of enmity to the *Anatomical Physicians*, (as Pliny l. 28. c. 1. *Aspici humana extra nefas habetur*, might call it so, I deny not. But what Law was there against it? How comes it to pass, that *Celsus* in his debate about the lawfulness of *Anatomizing* even *living bodies*, saith (or maketh others to say) that it is only *cruel*, or *nasty* and *abominable*; not *impiety* or a *breach of Religion*? Besides, how could any *Physician* in those days have dressed such wounds in which their *Entrails* either gushed out, or were hurt, in case it had been *unlawful to look upon them*? It is manifest that *Celsus* saith, a prudent *Physician* may from such accidents learn *Anatomy*; *Ita sedem, positum, ordinem, & figuram, similiaque alia cognoscere prudentem medicum*, and adviseth him to improve the occasion: And he was a Person learned not only in the *Physick*, but *Civil Laws* of his *Countrey*.

To convince our *Virtuoso* a little more, out of *School-books*, in which he ought to be conversant. Is there not a controversy agitated in *Seneca*, *Controvers. l. x. contr. 6.* about *Parrhasius* the Painter? how he brought an old *Olynthian*, and dissected him *alive*, thereby to draw the picture of *Prometheus* with a *vulture* preying upon his *Liver*! Is it not agitated *pro* and *Con*, by *Romans* and *Grecians*? Is there any one that saith it was *unlawful* for him to behold the *Entrails*? Nay, is it not said in the midst of *Rome*, that it was always *LAWFUL*? In *argumentis dixit, quantum semper Artibus LICUISSET, Medicos ut vim ignoratam morbi cognoscerent, viscera rescidisse HODIE cadaverum artus rescindi, ut nervorum articulorumque positio cognosci possit.* In *Quintilian* is there not a *Declamation Declam. 8. (Gemini languentes)* in which the *Mother* accuseth the *Father* for permitting the *Physician* to dissect one of the sick twins, thereby to discover the disease of the other! Doth not the *Mother* there bid him dissect the bowels of the dead youth? *Differ saltem, pater, hanc calamitatem: quicquid ex filio facis, facies ex cadavere. Si deprehendi potest languor dum occidit, facilius cum occiderit.* Doth she not describe the cruelty of that *Anatomy* very tragicaliy? *Passus est miser discurrentem per omnia reserati pectoris improbum vagam artis errorem.*

rem. Contentum fuisse medicum toto homine discurrentem primo putatis aspectu? Egesta saepe vitalia, pertractata, diducta sunt: fecerunt manus plura, quam ferrum. Stat juxta medicum pater apertis visceribus inbians, stillantem animam sedem cruentis manibus agentem: ne festinet, hortatur; jubet altius diligentiusque scrutari: Interrogat, dubitat, contendit, affirmat, & accepit de filii morte rationem — Inter hæc reficiebatur miser haustibus, detinebatur alloquiis, comprimebatur residuus cruor, claudiebantur aperta vitalia. Nemo unquam tam nova pertulit commenta sevitia, tanquam sanaretur occisus est. Vos tunc putatis illius tantum languoris medicum quassasse causas? quæstuit quicquid nesciebat, & usus occasione rarissima in omnem voluit proficere novitatem. After this she tells in what manner she gathered up his bowels, and by closing up his Corps fitted him for the Funeral. Corpus quod medicus, quod reliquerat pater, hoc sinu misera collegi, ac vacuum pectus frigidis abjectisque visceribus rursus implevi, sparsos artus amplexibus junxi, membra diducta composui. If any one can imagine, that this great Orator in so solemn a Declamation would have omitted so important an objection as the unlawfulness and impiety of beholding the entrails of the youth, certainly he thinks too meanly of the judgment of Quintilian, and too well of his own. It appears out of that Oration, that they had seldom opportunities of dissecting men alive, and therefore he calls it rarissimam occasionem. And that they were not ignorant of Anatomy and the inward fabrick of humane bodies, It is evident farther out of that Oration, where the Mother says the Physicians must needs already have learned that part of their Art.

Sufficit quod aliquando jam facta ex unius hominis inspectione, ad totius intellectum natura medicina profecit. Quid allaturus huic agrotos, quod non tot seculorum, tot languentium experimenta deprehenderint?

How could they behold the Ludi Circenses, the Gladiators fighting in the Theatre, and at the tombs of the deceased: or those sad spectacles described by Martial? I profess I think it as gross a mistake to say they held it unlawful to behold the entrails of men, as to deny the Augury by beasts.

As for what Mr. Glanvill saith about Democritus, that he was fain to excuse himself to Hippocrates for dissecting of beasts; this is as true as all the rest. Never was there a sifter second

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for

for Mr. Sprat, then Mr. Glapvill. They do not cite, but invent stories, and that with so much confidence, that a man must be assured by his own reading, before he can suspect theirs. That Hippocrates was a diligent Anatomist, is a thing every one must confess who either knows the manner of their education then, or hath looked into his Anatomical books de locis in homine, de fracturis, and sundry other pieces of his. That he not only contemplated the seat and action of parts in the dead, but living, appears by this passage, De Articulis sect 43. where he speaks about the setting of the Spondyles of the back; Itaque si tale contingat, palam est quod neque concutiendo, neque alio quodam modo reponi possit, nisi qui dissecto homine & manu in ventrem injecta, inquisitionem faciat, ut ex interna parte ad externam manu retrudat: atque hac in mortuo quidem facere possent, in vivo autem non ita. But I shall give an account of the Anatomy of Hippocrates, in the words of the learned Riolanus Anthropograph. l. 1. c. 2. Testatur Galenus Comment. in lib. 3. de artic. Hippocratem potissimum rationi corporum incidendorum sedulam operam dedisse, cum Anatonem mirum in modum ad artem medicam conferre sciret, quod nunc aperte docet cum spina naturam intelligi voluit, quam Empirici non secus atque ceterarum partium contemplationem inutilem esse dicunt. Ipsemet Hippocrates lib. 3. de artic. Commentarios de venis & arteriis pollicetur, quos nunquam videre potuit Galenus. Præterea librum de dissectione conscripsit, quem imperfectum habemus. Ipsemet Galenus libros de Anatome, secundum Hippocratis doctrinam composuerat, quorum deploranda est iactura. Hippocrates canes dissectis ut pulmones observaret. lib. de corde. Ibi dem monet quod dissectionis accurata hujus partis non est opus cuiusvis, sed periti artificis, & appellat istud opus Chirurgian. l. 6. Epidem. scribit hominem habere cola intestina cani similia. Idem lib. de intern. affect. testatur se in bove, in cane, & sue, quod impedibus dissectis tubercula in pulmone aqua referta invenisse, unde natus fuerat hydrops thoracis. Idem testatur se ex hominis ossibus ossa descripsisse: primus spina admirabilem figuram descripsit: primus vesiculas seminarias, earumque situm, omenti usum, valvulas venarum, ortum nervorum, lienis actionem,

actionem, uteri conformationem. Atque ut extaret aliquod monumentum aeternum & immutabile sua diligentia, laborisque in hoc studio exantlati, sceletum are fabricatum Apollini Delphico consecravit: ut Author est Pausanias lib. 10. And is it credible that ever Democritus should be forced to excuse himself to Hippocrates for cutting up of Animals, as if it were so uncouth and strange to him? I cannot answer for the Intellectuals of our Virtuoso, but no man of an higher capacity can believe it. The pleasantest part of this Narrative is, that there appears no such thing upon record. First of all the story of Democritus, how Hippocrates came and found him busie in dissecting of Animals, is called in question by Cortesius in *Miscellaneis*, as Riolanus tells me. And indeed I cannot perswade my self that those Letters in the end of Hippocrates works are genuine. But to pass by this exception. All that Hippocrates writes in his second Letter to Damagetus amounts to this. That at the request of the people of Abdera, he came to cure Democritus of his supposed madness, that being conducted to his house, he found him sitting under a Plantanus tree in a garb not much differing from a madman, and postures that had something of the same humor: Ipse Democritus sub ampla & humillima plantano sedebat, in veste crassa citra humeros desinente, solus, discalceatus, super lapidea sede, valde pallidus ac macilentus, promissa barba — Ipse vero cum inculto ornatu, super genibus, librum habebat, sed & alii quidam ex utraque parte adjacebant. Accumulata etiam erant Animalia multa per totum resecta. Et ipse quidem aliquando concitate incumbens scribebat, aliquando quiescebat, diu mutrumque se continens, & in seipso meditans. Deinde non longe post, hu peractū, exurgens deambulabat, & viscera animalium inspiciebat, & depositis ipsis digressus, rursus desidebat. — When Hippocrates approached near him, he was busie writing, and even then his deportment had something odde and Enthusiastical in it. Τὰ μὲν ἐμειδία, τὰ δὲ ἰζηγίλα — ὅτι δὴ πόλε γεράφων ἐρυσσιν ὤσιν, καὶ μετ' ὀρμῆν. After the first complements (which are great and not usual in those days) Hippocrates demanded of him what he was writing? He replied about madness: and what

about that, said the great *Physician*? To which he answers again thus. Τί γδ εἶπεν, ἄλλο πλὴν ἢ τὸ ἐν ὁμαίαν ἀνθρώποις ἐγ-
γίνεται, καὶ τίνα τρόπον ἀπολοφθῆναι. Ταῦτα γδ ζῶα ταῦτα, ὁμοῦσα,
ἐφη, ὁρῶν, τέτυκται, οὐ γὰρ ἀνθρώπων ἐνεκα, ἀλλ' ἐν ὁμοίᾳ Θεῷ ἔργα, χολεῖς
δὲ δι' ἐκείνην. Οὐ γὰρ οὐκ ἐστὶν καὶ θύσιν. *Quid enim, inquit, aliud quam quid sit, & quomodo in hominibus generetur, & quomodo allevetur.*
Nam animalia hac, qua vides, inquit, hujus gratia refeco, non quod odio habeam opera Dei, sed bilis naturam ac sedem quaerens. How much this and the whole passage of that *Entervue* makes for Mr. Glanvill's purpose, I see not. *Hippocrates* doth not blame him for anatomizing of animals, nor is surprized at the novelty, nor troubled at the impiety of the action. *Democritus* knowing what apprehension the people had of him, and fearing lest the garb and posture he was in might confirm to *Hippocrates*, the truth of the report tells him how he employed his thoughts, and that the Animals that lay there upon the ground, were not slaughtered by him in a frantick rage, out of hatred to the creatures of God; but cut up Anatomically by him, thereby to discover the seat and nature of the gall, and the effects it had upon *Maniacks*. Whereupon *Hippocrates* was wonderfully pleased with the testimony he gave of the soundness of his judgment, and after some other prudential discourses, departed, satisfied about the good condition of his Patient. But if *Democritus* were not out of his Wits, I believe Mr. Glanvill was to alledge such an impertinent story. But idle persons, that would upon easie termes acquire the repute of Learning, by citing quotations, are often thus imposed upon, and liable to mistakes. And perhaps there may be some person in the world that I know not of, who may have abused our *Virtuoso* in this case: but He should have minded the Text better.

What Pope Boniface the Eighth did, I know not. But I am apt to suspect a person that hath told me so many untruths. The place in the Canon-Law, which I am apt to believe Mr. Glanvill never saw: It is lib. 3. Extravag. titulo de sepultura. And Riolanus, whom I had rather credit, gives this account of it; *Inter Christianos Papa Bonifacius octavus bar-*
b. rum

barum & inhumanum judicavit, peregre mortuorum corpora exenterare, carnibusque spoliare, ut ossa lecta & tersa in locum sepulturae, quem vivi delegerant, commode perferri possent. It seems that Pope thought it an inhumane and barbarous thing not to dissect Bodies for information sake; but to embowel them, and reduce them into Skeletons, and so to carry their bones to distant places to be buried according to the desire of the deceased. I am apt to think this Canon was never applied to Anatomy, and perhaps there is nothing of Excommunication in it, since Riolanus doth not mention it.

As for the gross errors in Anatomy which Galen is charged with, I know not one that incommodes a man in point of Practice, but that the Method he took (however founded on false principles) was secure and good. Upon which it happened that all his followers implicitly submitted to his Anatomical relations without further Enquiry, and taught his Errors for truths: And perhaps a certain vanity seized Galen to contradict the famous Herophilus out of dissected Apes, thereby to raise his own credit. However it was, from him arose most of the mistakes in Anatomy, that were translated to the Moors, and from them to our Ancestors. The Moors are said by their Religion, to forbid the meddling with dead bodies: Which Assertion, how true it is, I know not, because that Avicenne and Albucasis commend the study of Anatomy, as necessary in a peculiar manner to Chirurgeons. They practised sundry Chirurgical operations in Cauteries, and opening Arteries, which seemed to require an Experimental skill in dissections, and which were their own inventions. In fine, Averroes pleads not any scruples of Religion for his ignorance in Anatomy, but laments the Civil Wars of the Moors, which hindered him from inquiring by dissection into those controversies betwixt Galen and Aristotle, which he had occasion to debate. Yet did Averroes at all adventures, assert the credit of Aristotle against Galen, out of an emulation against Avicenne who was a Galenist. From these two great men amongst the Moors, as the knowledge of Physick and Philosophy, happened to be imparted to the barbarous Christians of the West, so was there a feud propagated betwixt the Philosophers,

hinc [Galenus] universi fidem dedere, ut nullos repertus sit medicus, qui in Galeni Anatomia voluminibus vel levissimum quidem lapsum deprehensum esse, non tamen minus deprehendi posse censuerint. Vesalius in deduc. lib. de Fabric. hum.

sophers and the *Physicians*; and the *contraversies* were the more intricate, because the *Sciences* had not been so well translated out of *Greek* into *Arabick*, as was requisite; and they were worse put into *Latine*. After the taking of *Constantinople* by the *Turks*, when some learned men had fled thence into *Italy*, they began to impart unto the world new books, to acquaint the *West* with the *Greek* tongue, and with the *Greek* Works of *Hippocrates*, *Aristotle*, and *Galen*; and thereby multiplied many *Controversies* in the practice of *Physick*, about *Phlebotomy*, and *Purging*, and the like; especially about *bleeding* in a *Plurisy*, on which side it should be done. The contention was fierce, and some proofs being fetcht out of *Anatomy*, some persons were excited to enquire into humane bodies dissection, thereby to determine this controversy, and also the others betwixt *Aristotle*, *Galen*, and others. Amongst these *Vesalius* was (I had almost said) the first and principal, and by his indefatigable pains prevented much the industry of others. After him *Fallopins* and *Eustachius* were the most remarkable; though many others came in with their little inventions to make up the cry, and failed not to supply the inutility of their discoveries with excessive clamor. What Apologies were made for *Galen* by *Sylvius*,

and others, would be tedious to relate; they being so ridiculous, and repugnant to common sense, that nothing could stop the growing glory of *Vesalius* and his followers. The issue of all was, that as *Hippocrates* lost no credit by an ingenious confession of his mistake about the *Sutures* in the head of *Autonomus*; small errors being not observable in great Authors: So *Galen* still retained a great repute in the world, his other Works having advanced him above the effects of petty calumnies, or defaults. And the great *Guinterus Andemacus*, a competent Judge of old and new discoveries in *Physick* and *Anatomy*, gives this censure upon those curious Disquisitions: *Multa in rerum natura extant, quorum notitia non quidem Medicum aptiorem facit, sed medicina tantum profectum reddit.*

De vet. & nova med. comment. 8. dial. 5 p. 261.

dit, Sic nalli ob accuratam illam, ne dicam curiosam nimis, partium corporis perquisitionem Medici excellentiores, sed ob curationes dextre sentatas absolutasque censentur. Ideo etiam Hippocrates, Galenus, Erasistratus, & plures id genus alii, tantum ex rerum natura & corporis humani fabricatione scrutari voluerunt, quantum ad medicinam probe exercendam ex usu esse putarunt. Non eadem enim semper omnibus similem ob causam conducunt. Sic Anatome aliter physici inseruis, qui disciplinas ipsas propter se amant; alteris, qui illam non adeo affectant, sed nihil temere a natura factum esse demonstrant: aliter hi qui argumenta (ut ille ait) ad actionem quandam vel naturalem vel animale cognoscendam, ex partium humani corporis historia adferre nituntur: aliter medico qui manum aculeis, telorumque cuspibus probe exprimendis vel alicui parti apte excidenda vel sinibus & fistulis & abscessibus incidendis adhibiturus est; quo Anatomes usn nihil eque est necessarium.

Certainly it had been an action of greater ingenuity in our Novelists to have acknowledged the many excellent things that are in *Galen*, which are so advantageous to *Physick*, then to endeavour to render a man *multi ingenii*, multaque nihilominus habiturum, contemptible by the representation of a few defects in him, relating to things not much material to his profession. It must always be said of *Galen*, that he was the man who by his dextrous wit, happy practice, and great eloquence, as well as universal learning, did restore the glory of the *Hippocratical Physick*, which was in a manner extinct in his days. He again brought *Anatomy* into request, which had been slighted and dis-used so long: he himself dissected bodies privately, and publickly in the Temple of Peace; and amongst other Discoveries of his own, it is observable that he found out the use of recurrent nerves, whose influence upon the voice is such, that as they are pressed or cut into two, so a Dog becomes perpetually mute, or onely howls, never barks. Had that curiosity been but the discovery of some Novelists, what a noise would they have made? what boastings should we have had? But all that is good in *Galen* is passed by, and to make way for the glory of our new

In-

Vide Colum-
bam Anat. l.
14. & Vesal-
ium de fabrica
corp. hom. l.
4 c. 50

Inventors, *Vesalius, Fallopius, Carcanus, Eustacbius, Ingrassiat, Columbus, Arantius, Varolius*, are not so much as mentioned by Mr. *Glanvill*; to the end that we may (if we will) believe that it is the *genius of this Age* alone, which puts men upon discoveries, and that before *them* there were none that had merited *this* remark.

Plus ultra,
pag. 13.
Riolanus as-
serts the first
invention of
the Valves in
the veins to
Hippocrates.
Anthropogr.
l 5 c. 49.

"I instance in the most remarkable of their discoveries briefly: and those I take notice of are, *The valves of the veins*, discovered by *Fabricius ab Aquapendente*: The valve "at the entrance of the Gut Colon, found as is generally "thought by *Baughin*.— I cannot think these to be so remarkable discoveries, but that he might have found out many more, since the time of *Vesalius*, I shall name one who gave a great light to the *Circulation of blood*, and that is the discovery which *Realdus Columbus* made, that the blood did pass through the Lungs out of the right ventricle into the left, and so into the *Aorta*, and all the body. As for the *valves in the veins*, I believe there are few that think that *Fabricius ab Aquapendente*, was the first discoverer of them: for they were shewed to *Fabricius* by father *Paul*, that famous Venetian Monk, as appears in his *life* written by *Fulgencio*, and extant in *English*. Neither indeed was Father *Paul* the first Inventour of them, for they are described before by *Jacobus Sylvius*, Professor of Physick at *Paris*, as *Riolanus*, and *Slegelius*, and *Bartholinus* do inform the world. And as to the valve in the beginning of the Colon-gut (if there be such a one, and that it be not rather a protuberant circle, arising from the joyning of the *Ileon* and Colon, as *Pavins*, *Falcoburgius*, and *Riolanus* hold) whatsoever it be, it was discovered by *Varolius*, and called the *Operculum Ilei*, before that ever *Baughin* was born, as *Riolanus* doth demonstrate: there are two others that may as justly pretend to it, to better merit the credit then *Baughin*, and those are *Solomon Albertus*, whom *Bartholin* inclines unto; and *Joannes Posselius* of *Montpelier*, whom *Riolanus* also favours.

Riolanus Anth-
ropogr. l. 5.
c. 49. Mar-
guard. Slegel.
de circul.
sangu. l. 1. p. 7.
Bartholin. in
libello de
venis c. 2.
Varolius Anat.
l. 3. c. 3. Si-
lan. Anthro-
pogr. l. 2. c. 13.
Bartholin. A-
nat. ref. l. 1. c.
21.

Plus ultra,
pag. 14.

"The Sinus of the veins, and their use found out by Dr. *Willis*— I wonder Mr. *Glanvill* should not acquaint us with those particular Sinus which Dr. *Willis* should finde out; for since

place in common discourse, when we speak undeterminately of the *Sinus*, we understand those of the *brain*, it did become him to tell us which others he meant: lest a man that knew his skill, should apprehend him so ignorant as to think that Dr. Willis had newly found out those *Sinus*, one whereof hath for above two thousand years born the name of *Herophilus*, and was called *Torcular Herophilii*, in Greek *Ανυος*. But I shall be so favourable as to think that these are not the *Sinus* he meant, Dr. Willis having tried nothing more in prosecution of them, then to pursue the *Circulation of the blood* there by the injecting of *Inkish liquor*, whereas *Wepferus* used a *tip-flare of Saffron*; and *Bartholin* evidenced the *same thing* by a pair of bellows, or tube and winds insufflated. I do believe that He, or they that suggested this to him, did mean the *Sinus* or *vena vertebrales*, which are described exactly in the Doctors Book, in the thirteenth Table. But I must tell him, that whatsoever there is in that Piece, which is *Anatomical*, the glory thereof belongs to Dr. Lower, whose *indefatigable industry* produced that *elaborate Treatise*; and any man that knows the *great practice* of that other Doctor, will grant, that although he could not want *abilities*, yet he wanted *leisure* to attend to such *painful and tedious inquiries*. Dr. Willis indeed *candidly* doth relinquish this honour to Dr. Lower, and his pains deserved your commendation (Mr. Clauvill) if that be of any value, so much more then those other inventions that are celebrated by the *Virtuosi*, by how much the subject was more *minute and subtle* which he was to trace. All that Dr. Willis contributed, that I hear, was the *discourses and conjectures* upon the *Anatomical deductions* of Dr. Lower, which as *ingenuous* as they are, I am sure neither are, nor ever will pass all for *inventions*. But in the case I now mention, I am confident that Dr. Lower is so *ingenuous*, as to acknowledge that what He exhibits there, is taken out of the *Cuts* of *Varolius*, as far as where they empty themselves into the *subclavian veins*; but I think that as to the *Synus*, or *veins*, and *arteries* all along the *Spine*, as there is not any *Cut* of them extant before that I hear of, so I allow them to pass as his *invention*: but the *accurateness* of his *Neurology* equals to the best Inventors.

N

But

Dr. Willis de
cerebro C. 6.
p. 82, 83.

J. J. Wep-
ferus Apo-
plex. p. 116.
Bartholin. A-
nat. l. 3. c. 7.

But if Mr. *Glanvill* injur'd Dr. *Lewer* in attributing what he invented unto Dr. *Willis*, he will not conceal his own discoveries, you shall see what a *Divine* can do in *Physick*. "St. St"! I adde the *origination of the Nerves*, which were of old supposed to arise out of the substance of the *brain*, but are found by late *Anatomists* to proceed from the *medulla oblongata*. This is such an *Addition* as becometh our *Novelists*, most that they pretend unto being no more then Mr. *Glanvill* here boasts of; and which is so pitiful an accessional in *Anatomy*, that none ever bragged of it, or upbraided the *Ancients* about it, that I remember, except *Bartholin* may be said to do it. As to the late *Anatomists*, unto whom he ascribes this *invention*, I would he had told their names. The difference betwixt the *cerebrum*, *cerebellum*, and *medulla oblongata*, is a modern (but not very late) distinction. Some have made the *medulla oblongata* and the *spinal marrow* to be but productions of the *brain* and *cerebellum*, from whence it raiseth it self by four *foundations* or *roots*: the discrepancy betwixt that and the other parts whence it is *originated*, not being such as to justifie any great contest about it: since it is the usual course of *Nature* in its progress from the union of two different bodies, to produce an intermediate substance, participating of the nature of both. *Spinalis medulla ortus*

Vol. Coiter. observ. anatom. miscel.
Ex substantia cerebri & cerebelli quatuor
radicibus oritur primum truncus insignis,
Medulla spinalis appellatus, ex quo multi
emergunt surculi, nomine nervorum insi-
gnium. *Varolius* Anatom. l. 1. c. 13. p. 12.

principium rectius cerebro atque cerebello acceptum fertur, unde non immerito caudex, sive processus, sive soboles cerebri appellatur: nam vix in ullo, nisi in duritie (est enim cerebro aliquanto solidior & firmior) videtur a cerebro differre. Some have made the *brain* & *cerebellum* to be productions of the *spinal marrow*, which enlargeth it self within the *skull*, and generateth those two *Apophyses* called the *cerebrum* & *cerebellum*. In fine, it doth not appear that the *Ancients* mistook much the place of the *origination of nerves*, if you reckon amongst them *Vesalius* and *Fallopious*: but they said they rose all from the *brain*, understanding by that word all that which is included within the *skull*, and termed that to be the *spinal marrow*, which was without the *skull*, and whence those other *paria nervo-*

rum seem to rise, which *Anatomists* describe. And this subtilty of Mr. *Glanvill* is so little regarded by late *Anatomists*, that *Morbius* (a man of as great note as most are) flights it by the example of *Hofman*, whose sense I shall here report : *Monendi sunt adolescentiores, ne forte morentur illos qui neglecta veteri distinctione dicunt, Omnes nervi sunt a medulla, sed alii ex illa, antequam cranio excidat, alii ex eadem, cum jam in spinam delapsa est, & Spinalis dicitur. Quid enim*

*habium fun-
dament med.
c. de usu ner-
vor. p. 806.
Caspar Hof-
man. Instit.
med. l. 2. c. 65.
sec. 1.*

hoc aliud est, quam frustranea nominum novatio? Cum dico me de nervis ex cerebro ortu acturum, intelligo totum id quod cranio continetur. There is another Origination of the nerves, which is as ancient as Aristotle, and which Hofman and Vander Linden assert, whereby they are deduced immediately and formally from the brain, but immediately and materially from the heart; for so much as they hold each nerve to be an Artery vested with the membranes of the brain, and so issuing to several parts. This opinion is very agreeable to the observations that occur in the practice of Physick, and their arguments seem to me so plausible, that I am soaverse with Mr. Glanvill to proclaim a new origination of the nerves, that I much doubt whether the followers of Galen were not deceived, and the Peripateticks in the right. See Vander Linden Disp. 38. de vasis & nervis, and Hofman de partib. similis. in thes. de orig. nerv. sec. Aristot.

So Dr. Charlton in his Discourse to the Royal Society concerning the Brain, takes the liberty to understand by the Cerebrum as well as others, totum illud corpus quod Calvaria concavo continetur (pag. 67. de Propr. cerebri humani) though afterwards, when he comes to speak more accurately, he treats of the Medulla oblongata thus: Cerebro proxime subijcitur alma nervorum ad sensus spectantium mater, & sanis argentei (sicut Saylen in Ecclesiastice elegantis h. d. obscura Allegoria vocat Medullam spinalem) principium Medullae scilicet intra cranium oblongata. Behold the addition of Mr. Glanvill!

It is clear now that Mr. Glanvill's new addition amounts onely to this, that the Ancients did some of them hold that the nerves had their original from the brain; others deduced them from the heart. Some (perhaps before *Varolius*) did subdivide the brain into several parts, and said that the nerves had their origination from the medulla oblongata, and not from the cerebrum and cerebellum. This nicety Dr. Willis makes some use of, but since he explicates no-

*V. de Varol.
an. l. 1. c. 3.*

If *Varolius* found it out, as I believe he did, by a peculiar way of distilling the blood, what is it that Mr. Glanvill then adds? I am sure that *Fracastorus* said, *Varolius* primum principium Spinalis medullae vel intra cranium sobolecere in nervos, quorum origo olim à cerebro petebatur, docuit.

thing of the *brain* with a *mechanical accurateness*; I shall only subjoyn, that whosoever shall *view* or *eat* that which they call *Medulla oblongata & spinalis*, and compare it with the *marrow* that is in the *bones* otherwise, he will think it a less *impropriety of speech*, to say the *Medulla oblongata* is a part of the *brain*, then to term it a *Medullary substance*.

"And though the *Succus Nutritivus* be not yet fully agreed upon by Physicians, yet it hath so much to say for it-self, that it may not unreasonably be mentioned amongst the new Inventions—— It's strange Mr. Glanvill should entitle this opinion about the *Succus Nutritivus* to so great a degree of probability, as he doth. Physicians are so far from being fully agreed upon it, that, excepting Dr. Glisson, Dr. Charleton, and perhaps one or two more, the rest do generally reject it. Dr. Highmore, Dr. Willis, and Bartholine have written against it; and so hath Deusingius writ a particular discourse against it. Nor do I doubt, but whosoever peruseth those Authors which I refer unto, will be so far from imagining it reasonable to ascribe the *Succus Nutritivus* to the number of modern Inventions, that he will term it at best but an ingenious Paradox, which when the first surprise is over, vanisheth with the appearance of being ridiculous. How much doth our *Virtuoso*, and Bartholine differ? Prodeat Herophilus, ex antro educatur Democritus, advocentur professores cujuscunque sortis & etatis, si in dissectionis corporum nervis ullum invenerint liquorem nutritioni opportunum, nolim inter eos locum mereri.

"But of all Modern Discoveries, Wit and Industry have made in the Oeconomy of humane nature, the noblest is that of the Circulation of the blood, which was the invention of our deservedly famous Harvey. 'Tis true, the envy of malicious Contemporaries would have robb'd him of the Glory of this Discovery, and pretend it was known to Hippocrates, Plato, Aristotle, and others among the Ancients; but who ever considers the expressions of those Authors, which are said to respect the Circulation, who finde that those who form the inference, do it by a faculty that makes all kind of Compositions and Deductions, and the same that assists
"the

Highmore de
affect. hypo-
chondr. c. 4.
Willis in ana-
tome cerebri
c. 20.

Bartholin spi-
ritus. l. c. 3.

Bartholin.
spiritus. l. de
vasis lym-
phat. p. 23.

Plus ultra,
pag. 11.

"the *Enthusiasts* of our days, to see so clearly all our altera-
 "tions of *State* and *Religion*, to the *minutest particulars* in
 "the *Revelation* of *Saint John*. And I think it may be as
 "well concluded from the first chapter of *Genesis*, as from
 "the *remains* of those *Ancients*, who if *they* had known
 "this *great* and *general Theory*, how chance they speak no
 "more of a thing, which no doubt they had frequent oc-
 "casions to mention? How came it to be lost without
 "Memory amongst their followers, who were such *su-*
 "*perstitious Perers* upon their *Writings*? How chance
 "it was not shewn to be lodged in *those Authors* before the
 "days of *Dr. Harvey*, when *Envy* had *impregnated* and de-
 "termined the *Imaginations*, of those who were not wil-
 "ling any thing should be found anew, of which themselves
 "were not the *Inventours*? But 'tis not only the re-
 "mote *Ancients*, whom time hath *consecrated*, and *dis-*
 "*stance* made *venerable*, whose *Aspes* those *fond men* would
 "honour with *this discovery*; but even much *later Au-*
 "thors have had the glory fastned upon them. For the
 "Invention is by some ascribed to *Paulus Venetus*; by o-
 "thers to *Prosper Alpinus*; and a third sort give it to
 "*Andreas Casalpinus*. For *these*, though either of them
 "should be acknowledged to be the Author, it will make
 "as much for the design of my discourse, as if *Harvey*
 "had the credit: and therefore here I am no otherwise
 "concerned. but to have *justice* for that excellent man:
 "and the World hath now done *right* to his *Memory*,
 "Death having overcome that *Envy* which *Dogs living*
 "*vertue* to the *Grave*; and his *Name* rests quietly in
 "the *Armes of Glory*, while the *Pretensions* of his *Rivals*
 "are creeping into *darkness* and *oblivion*.

Whether those that have gone about to deprive *Dr.*
Harvey have been incited by *Envy* and *Malice*, it is
 hard for any *considerate* man to judge; since those which
 first proposed the *doubts* about the *Author*, were great friends
 to the *Theoreme*; such as *Walaus*, who first mentioned it;
Riolanus,

Riolanus, Nardius, Fracassarus, and Joannes Antonides Vander Linden: All of them pay a great respect to *Dr. Harvey's* Performances; All of them concur with him generally in his *Affertions*, saving that *Riolanus* made some variation therein, and perhaps his passion might blinde his candour; though I do not think so, because I finde him zealously vindicating of *Dr. Harvey* from those imputations by which *Walaus* endeavoured to transfer the credit of the invention upon *Father Paul*.

Another thing I must take notice of is, that *Mr. Glanvill* speaks very peremptorily about a thing he hath not enquired into, for it is evident that he never read the passages out of the *Ancients*, which are cited by *Walaus* and *Riolanus*, to shew they were not altogether ignorant of that motion of the blood which is called *Circulation*. He thinks it may be as well concluded from the first chapter of *Genesis*, as from the remains of the *Ancients*. And why so? Is there any thing mentioned in the first chapter of *Genesis*, that sounds like the *Circulation of the blood*, or any words that can be applied unto this late discovery? not one. But any man that understands Greek, must confess that the words ἀμπώλις, πλῆμυελις, and περίοδοι in *Hippocrates* (whatever he meant by them) do most emphatically signify the *Circulation of the blood*, as it is now proposed. If I merit not to be believed herein, take the judgement of *Julius Caesar, Scaliger* upon *Aristotle de insoma. xliij. 1444. Ποταμοὶ δὲ μὴ κατὰ τέρπον γινώσκουσι, ἀμπώλις, περίοδον σημαίνουσι.* I shall not from this place deduce the mystery of the *Circulation of the blood*, by saying that rivers circulate under ground thorough that sandy earth, which those that dig in Wells, when they come unto, they can descend no further: (which *Helmont* in the *Brabant* Dialect calls *Quellem*, other *Dutch-men* name *Well-ground* and *Well-sand*, and after return unto the *Sea* again by open *Channels*: But whatever the intent of the *Philosopher* was, that ἀμπώλις, περίοδος, properly imports such a thing, and that we have the name given it by *Aristotle*, this *Scaliger* confesseth, *Ejus ad apotelesma xxxi. hac sunt verba. Ἀμπώλις, περίοδος, motum; ut in febribus accessionem. Circutum Calvus*

Calvus cum dicit, fideliter, non plene explicat. Neque enim circumducitur sanguis, ut περιόδῳ impleat significationem. Nam in febribus idcirco dicitur περιόδῳ, quia revertitur paroxysmus: quasi circumductus ob diem parum & vacuum a morbo. From which it is evident, that if Scaliger had known that the blood had circulated, he would have granted it to have been properly expressed here in the Text: which is more than He would say of any Apocalyptical discoveries, or deductions of that opinion out of the first Chapter of Genesis. And if the word περιόδῳ be so significant, it is hard to deny that Hippocrates did not set down the thing it self in this passage, Αἱ φλέβες διὰ τὸ σῶμα περιούρως, πνεῦμα, καὶ ῥεύμα, καὶ κίνησιν παρέχοντα ἀπὸ μῆτις πολλὰ διαβλάσσανσι. Καὶ αὕτη μὲν ἢ μία ὄθεν ῥεῖται, καὶ ἢ τελευτῇ, ὡς οἶδα. Κύκλῳ δὲ γεγεννημένῳ, ἀρχὴ ὡς ἑρπύλη. Vena per corpus fusa spiritum, & fluxum, & motum præstant. Ab una multa propagantur: sed illa una unde incipiat, ut ubi desinat, non scio. Circulo enim ducto, principium non invenitur. And in that other; Ἐς τρεῖς χεῖρας τροφή, καὶ εἰς ὀνυχας καὶ τὴν ἑσχάτην διαφανέην ἐνδοθεν ἀφικνέσθαι. Ἐξ ὧθεν τροφή ἐκ τῆς ἑσχάτης διαφανέης ἐνδοτάτω ἀφικνέσθαι. Σπέρμα μία, ξυμπνοια μία, ξυμπνοια πάντα. Καὶ ὡς ὁλομελὴς πάντα κατὰ μέρος. ἢ τὰς ἐκαστὴν μέρος μέρος πρὸς τὸ ἔργον Ἀρχὴ μεγάλη ἐκ ἑσχατοῦς μέρος ἀφικνέσθαι. Ἐξ ἑσχατοῦς μέρος ἐκ ἀρχῆς μεγάλης ἀφικνέσθαι. In piles alimentum [id est, sanguis nutritus] & in ungues, atque extremam superficiem intus advenit: fatis alimentum ab extrema superficie intus revertitur. Corruptio una, conspiratio una, consentientia omnia. Certe quod ad communem naturam omnia: in quavis parte partes ad opus. Principium magnum [id est Cor, per transmissos spiritus & sanguinem] ad extremam partem pervenit: ab extrema parte ad principium magnum revertitur. There are more passages in the same Author which seem to import the same thing, though his usual brevity and obscurity is such, that had not Harvey and others dilucidated the point, we had never, I believe, fixed this explication upon him, which amounts to no more than a new gloss upon an old Text: which yet is sufficient to check the largeness of Mr. Glanvills assertion. The περιόδῳ of Plato, and his making the Heart to be the original

Hippocrates
de oss. nat. l.
7.

Ex lib. de a-
lim. l. 4. 12.

Plato in Ti
n. 2).

of the veins, καὶ τὸ περιφερόμενόν καὶ πάντα τὰ μέλη σφοδρῶς ἀνακινῶ; these are something more then is to be found in the first of *Genesis*. And that passage of *Aristotle* de Gen. Anim. l. 4. c. ult. is so unlike any thing of *Moses's*, and so like to the doctrine of *Harvey*, that any man must blame Mr. *Glanvill*, for rashness of what he says. The words are thus set down by *Riolanus*, and I have not the Original by me to consult: *Cum cœlestia corpora circulariter moveantur, inferiora corpora motum illum imitari debent, cumque Oceanus fluxu & refluxu moveatur ab influxu Lunari, similiter humores ealem motum habere necessum est.* Which words seem clear enough, so as to justify the *Epiphonema* of my Author, in opposition to our *Virtuoso*. *Quid ista significant nisi sanguinis Circulationem.* He that would be informed more fully about the judgement of the *Ancients*, whether there be any thing in them that discovers the *Circulation of the blood*, to have been known unto them; or that they were not totally ignorant, and without any apprehensions of it: let him read the first letter of *Waleus*, and the several Pieces of *Joannes Riolanus* about the *Circulation of the blood*, and the disputations of *Vander Linden* about the *Circulation of the blood*, in which he vindicates it in a prolix discourse unto *Hippocrates*. I will not trouble my self to transcribe them: It is evident that all men do give unto *Harvey* the credit of having so explicated it, and Anatomically proved it, that he may as well be termed the Author of it, as *Epicurus* and others the Authors of that *Philosophy* which they derived from *Pythagoras*, *Democritus*, *Leucippus*, and *Ocellus Lucanus*. Nor hath *Harvey* any other Plea and Right to the Invention, then that he did more fully and perspicuously declare it, and in the most judicious and solid manner assert what others had but hinted at, or faintly insisted on.

Nor is Mr. *Glanvill* any better acquainted with the notions of the *Modern Writers*, then he is with those of the *Ancients*. He saith, that some have ascribed the *Circulation of the blood* to *Paulus Venetus*. I must inform the Reader (who may easily mistake, if he be one of the ordinary *Comical Wits*) that it is not to be ascribed to *Paulus Venetus*, the great Traveller,

veller, who is generally understood, when *that name* is mentioned; none can say that *he* brought it from the Kingdom of *Cashay*. But *Pater Paulus Sarpa* (or *Serpa*) or *Father Paul*, the famous *Venetian Monk*, of the order of the *Servi*; who signatified himself during the time that *Venice* was interdicted. He was a *Student* at *Padoa* at the same time that *Harvey* was there, and discovered to *Aqua pendens* the *valves in the veins*, which discovery that great *Anatomist* appropriated to himself; and so *Harvey* was thought to have abused the same *Father*. But since *Fulgentio* in the life of *Padre Paolo* doth not challenge *Harvey* for this Cheat, as he doth *Fabricius* for that other; and since *Marquardus Slegelius* could not hear of any such thing upon a strict Enquiry at *Venice* and *Padua*, I know not any since *Walaus* and *Franciscus Ullmus*, that have ascribed the invention to *Paulus Venetus Servita*.

Vide Slegel.
de motu Sanguinis
c. 2. &
Rillan. in
not. ad ep.
Walai.

Neither did I ever read of any man that attributed it to *Prosper Alpinus*: nor is it credible that any ever did so. For that great *Physician* established his glory by being an excellent *Practitioner*, and not by any *Anatomical* curiosities, which he rather contemned, then pursued: and till I know what Author Mr. *Glanvill* follows, I believe the mentioning of him was occasioned by that way of discourse which is common to the *Wits* of this Age, to blunder out any thing: and by laughing at impossibilities (of their own suggestion) to explode substantial truths, or represent them as forgeries. But if any did deceive the world in attributing the Circulation of the blood to *Padre Paolo* and *Prosper Alpinus*, it doth not follow but that *Andreas Casalpinus* was the first Inventor of it, and proposed it to the world in his *Medical* and *Peripatetical Questions*, though not in any Set Discourse, but as it casually falls into the discussion of other Problems: Whereupon it was little regarded, and not enquired after; the book being also scarce, and he being of that faction of *Physicians* which adheres to *Aristotle* against *Galen*, whence it hapned that few read his *Paradoxes*, and one of the bravest men of the latter Age hath been almost buried in oblivion. However, an ingenious *Florentine*, call'd *Joannes Nardius*,
O hath

hath asserted the repute of *Andreas Casalpinus*, for precedence to *Harvey* in the *Discovery*; nor doth the same *Author* doubt, but that *Erasistratus* was of the same opinion: but he saith of *Casalpinus* this: *Fœlix cui contigit post mortem nan- cisci clarissimum Patronum Guglielmum Harveium Regium Medicum, nobisque per charum, qui abortivam illam opinio- nem excoluit adeo, ut nihil cultius nostro seculo, nilque mirabi- lius occurrerit curiosis & amanarum literarum amatoribus.* To decide this question, and to put an end to those disputes which trouble some of our *Virtuosi* so much, by reason of that little converse they have with *Books*, I shall draw out the opinion of *Casalpinus*, as he expresseth himself in his *Dispu- tations*.

*Andreas Ca-
salpinus u.
peripatet. l. 5.
q. 3.*

As a great abettour of *Aristotle*, he avows that the *Heart* is the principal part in man, and the original of the *veins, ar- teries, and nerves*; which is the opinion of *Hofman, Van der Linden*, and other *Aristotelian Physicians*.

Ib. q. 4.

He describes the *Fabrick* of the *Heart* as exactly as any of the *Circulators* in reference to the *Valves*, so much talked of; but he declares not their shape: *Vasorum in Cor desinen- tium quadam intromittunt contentam in ipsis substantiam, ut vena Cava in dextro ventriculo, & arteria venalis in sinistro: quadam educunt, ut arteria aorta in sinistro ventriculo, & vena arterialis pulmonem nutriendi in dextro: omnibus autem mem- branule sunt appositæ & officio delegate, ut oscula intromittentia non educant, & educentia non intromittant.*

And for the account of the *Vena arteriosa*, and *Arteria venosa* in the *Lungs*, *Harvey* is not more perspicuous, then he is afterwards, where he makes the one to be an *Artery*, the other a *veine*, viz. *Putaverunt autem Medici usum hunc non videntes commutata fuisse vasa in pulmone, ut Arteria quidem similis esset vena, vena autem similis Arteria: appellantes ve- nas vasa omnia quæ in dextrum ventriculum desinunt, Arterias autem, quæ in sinistrum: signum multa & absurditates excogi- tantes ut usum invenirent. Pulsat igitur in pulmone vas dextri ventriculi, hæc enim e corde recipit, ut Arteria magna, & si- militer fabricatum est ejus corpus. Vas autem sinistri ventri- culi*

culi non pulsat, quia introducit tantum, & ejus corpus simile est reliquis venis.

He holds that the motion of the Heart and Arteries depends not upon any pelfsick Faculty, but that it ariseth from the *oxygous*, ebullition; or effervescency of the blood in the Ventricles; and that the Heart and Arteries are dilated at the same time, the blood dilating the Heart, and issuing out thorough the valves of the Aorta and Pulmonique Artery at the same instant, which is pure Cartesianism.

He holds that the Blood comes up from the veins to the Heart, and there acquires the last Perfection, and becomes vital and spirituous: in the mention of the Arterious Blood, he useth indifferently the termes of Blood, Spirit, and natural heat, which I desire may be observed, lest the proofs seem not full enough, and he be construed to speak of nothing but spirits and natural heat in the Arteries. He saith, that this Blood having acquired its Perfection in its passage through both the ventricles, is distributed through all the parts of the body, for its nutriment by the Arteries, in which Arteries there is such a constant quantity of Blood, that the effervency of that in the Heart impells the whole continuation of the Arteries, so that they beat all at once.

Cum enim pulsatio Cordis & Arteriarum sit accidens quoddam quod ex necessitate insequitur humoris in corde effervescentiam, qua sanguinis generatio perficitur, ut in ceteris qua igne elixantur, accidit. lib. de vita & mort. c. 2. intumescente corde necesse est simul omnes Arterias dilatari, in quas derivatur fervor: non enim repleti potest una pars, quin totum fiat majus: ubi non omni ex parte vasa qua continua sunt fuerint exinanita. Nam nullo intus existente corpore, non contingit simul repleti principium & extrema, cum motus non fiat in instanti: existente autem per totos canales aliquo spiritu, simul ac in principio alius fuerit genitus, necesse est totum simul dilatari, unum enim sit spiritus accedens cum toto. Cum ergo totum reddatur majus simul ac accesserit pars, non potest una pars dilatari, quin eodem tempore dilatetur totum.

Mark this, where he makes the Heart and Arteries to be one continued receptacle of perfect blood: by which you must explain what he says in some places, as if only spirits or natural heat went into the Arteries, or returned by the veins.

Est autem veluti totum quoddam Arteria omnes cum corde; Continuum enim est vas sanguinis perfecti. Spiritu autem efflante inhabitum corporis, & distributo particulis sanguine, necesse est tumorem vasorum desiderare, qua est pulsus contractio. Continue autem hoc fit, quia continua est partium nutritio, & continua sanguinis generatio in corde. Elevatio igitur Spiritus a calore fit, non tamen temere, sed alicujus gratia. Nam sine hujusmodi amplificatione non fieret distributio alimenti in omnes partes.

He plants a kind of *Flammula cordis*, or fire in the heart, which causeth the ebullition, and imprints a spirituousness in the blood that issueth out into the Arteries. *Hujusmodi locus Cor est in quo secundum Naturam elementum praparatum ardere possit, & fieri spiritus: vena alimentum suppeditant, Arteria flamma spiritum recipiunt.*

He saith, that the Blood moves towards the Heart, as the Oyle to the flame of the burning Lamp, and that the Valves as the orifice of the *Vena Cava* which immit the blood, are placed there to moderate the source of the blood, lest it should fall in too fast, & extinguish the vital fire: and that the valves at the entrance of the *Aorta* do flie open upon the effervescency of the blood, by the pressure of it every way, to get more room: it finding no out-let but by those yielding valves, which were so placed, lest upon any accident, or violent passion, the arterious blood should regurgitate into the Heart, *Motus fit ex venis in Cor caliditate alimentum trabente, ex corde autem in arterias, quia hac solum patet iter propter membranarum positionem, posita autem sunt hoc modo membrana, ne unquam contingeret contrarium motum fieri, quod accidere posset in vehementibus animi perturbationibus, aut aliis causis, a quibus sanguinis retractio fit ad Cor: Obsistunt enim huic motui membrana. Nam si hoc modo condite non essent, ignis cordis vel levi causa extingueretur. Si enim motus fieret contrarius simile esset, ac si flamma compingeretur deorsum ad alimentum, quod cum minime sit praparatum, aut copiosius quam oportet, ignem suffocat. Oportet enim alimentum praparari, & alicujus dispensari ad locum flamma.*

He saith that this arterious blood, or spirit, is distributed into

into all parts of the *body*, with great *celerity*, and that it is that which *nourisheth the parts*: and that upon its diffusion into the *habit of the body*, the *spirits* are very much *exhausted*, and the *corpulent* part of the *aliment* doth remain, being coagulated partly by *heat*, and partly by *cold*.

He saith, that the variety of the *pulse*, as to *strength* or *debility*, *celerity* and *slowness*, depends upon the nature of the *vital fire*, the nature of the *aliment* with which it is fed, and sometimes upon the particular *Fabrick*, or conformation of the *Heart*, in which that *Fire* is seated.

He placeth *Anastomoses* betwixt the *veins* and *arteries* every where in the body. *Osculorum communio est non solum in corde, sed etiam per totum venum & arteriarum ductum,*

He saith that the blood is never *extravasated*, but where it is aggregated to any part by way of *nourishment*, or else it *putrifies*: he doth not understand how it should not *coagulate* if once *extravasated*; nor can he comprehend how it should be reassumed into the *veins* in such a case. *Venam continuam esse oportet, usque ad cordis ventriculos, ut inde omnis virtus descendat: nec ullibi contingit disjunctam esse; sanguis enim calore cordis destitutus concrescit, & tandem putrescit.*

He makes the *Blood* to pass betwixt the *right* and *left* ventricle of the *Heart*; partly by the *Lungs*, and partly by the *Septum Cordis*. *Pulbre igitur condita sunt omnia. Cum enim fervere oporteret in corde sanguinem, ut fieret alimenti perfectio: primo quidem in dextro ventriculo, in quo crassior adhuc continetur sanguis, deinde autem in sinistro, ubi sincerior sanguis est: partim per medium septum, partim per medios pulmones refrigerationis gratia ex dextro in sinistrum mittitur. Interim autem pulmo abunde nutriri potest: totum enim eum sanguinem absorbere, quem recipit, egreditur fines rationis. Non enim rara esset ejus substantia & levis, ut videtur si tantum alimenti, vim in suam naturam converteret.* This he thus further explains. *Pulmo per venam arteriis similem ex dextro cordis ventriculo fervidum hauriens sanguinem, eumque per anastomosi arteriae venali reddens quâ in sinistrum cordis ventriculum tendit, transmissio*

misso interim aere frigido per aspera arteria canales, qui juxta arteriam venalem protenduntur, non tamen osculis communicantes, ut putavit Galenus solo tactu temperat. Huic Sanguinis Circulationi ex dextro cordis ventriculo, per pulmones in sinistrum ejusdem ventriculum optime respondent ea quæ ex diffinitione apparent. Nam duo sunt vasa in dextrum ventriculum desinentia, duo etiam in sinistrum. Duorum autem unum intromittit tantum, alterum educit, membranæ eo ingenio confectis. Vas igitur intromittens, vena est magna quidem in dextro, quæ cava appellatur: parva autem in sinistro, ex pulmone introducens, cujus unica est tunica, ut cæterarum venarum. Vas autem educens Arteria, est magna quidem in sinistro, quæ Aorta appellatur, parva autem in dextro ad pulmones derivans, cujus similiter duæ sunt tunice, ut in cæteris arteriis.

He holds that the spirituous or arterious blood is cast out, and diffused vigorously into the habit of the body, that the veins and arteries being continuous by anastomosis, it returns to the Heart again, vigorating the blood of the vena porta and Cava as it returns: which is sufficiently intimated in that he deduces all the vigour and vitality of the blood from the Heart, and that this vigour or natural heat is carried over the body by the Arteries alone, and that it is necessary that the whole venous Systeme, or contexture of Arteries and veins be continuous, lest the blood in the veins, being destitute of the cordial heat, should coagulate and putrifie. He holds that this motion, or Circulation of the blood is without intermission: and that the swelling of the veins upon the Ligature is a sufficient proof of it. But he holds, that the recourse of the blood by the veins is greater in the sleep, then when we awake; which he proves thus, in that the veins are more full and tumid during sleep, then waking: and the pulse weaker, and more slow; as any man may observe. From whence he concludes, that the natural heat (which is the Arterious blood, as I observed before, to prevent all possible mistakes) which was otherwise in great part expended upon the nerves and sensories, doth in sleep return: and fill the veins more visibly (that exhaustion ceasing) then when we are not asleep.

His opinion will be best set down in his *own words*; and I think it necessary to do it, because *Nardius* hath done it so *imperfectly*, that one would attribute as little to his *allegations*, as to those which are cited out of the *Ancients*; and if I had not read *Casalpinus* long before, I should have thought the *Florentine* to have intitled *Casalpinus* to the opinion out of envy to *Harvey*, or out of a partial desire to advance the glory of the *Tuscan Academy* at *Pisa*, when *Casalpinus* was Professor. Thus that learned man writ about the year 1590. or a little after.

Andreas Casalpinus Quest. Medic. l. 2. Qu. 17.
edit. venetæ secunda in 4^{to}. A. D. 1593. fol.

234.col. 1.

‘Sed illud speculatione dignum videtur, Propter
‘quod intumescunt venæ ultra locum apprehensum, non
‘citra: quod experimento sciunt qui vena secant:
‘vinculum enim adhibent citra locum sectionis, non
‘ultra: quia tument venæ ultra vinculum, non citra.
‘Debuisset autem opposito modo contingere, si motus
‘sanguinis & spiritus a visceribus fit in totum
‘corpus: intercepto enim meatu, non ultra datur progressus:
‘tumor igitur venarum citra vinculum debuisset fieri. An solvitur dubitatio ex eo quod scribit
‘*Aristoteles*, de Som. c. 3. ubi inquit, Necessè enim
‘quod evaporatur aliquousque impelli: deinde converti
‘& permutari, sicut Euripum: calidum enim cujusque
‘animalium ad superiora natum est ferri: cum autem
‘in superioribus locis fuerit, multum simul iterum revertitur, ferturque deorsum. Hæc *Aristoteles*.

Pro-

'Pro cuius loci explicatione illud sciendum est :
 'Cordis meatus ita a natura paratos esse, ut ex *vena*
 'Cava intromissio fiat in Cordis ventriculum dex-
 'trum, unde patet exitus in *pulmonem* : ex pulmone
 'præterea alium ingressum esse in Cordis ventriculum
 'sinistrum, ex quotandem patet exitus in *Arteriam*
 'Aortam, membranis quibusdam ad ostia vasorum
 'appositis, ut impediunt retrocessum : Sic enim
 'perpetuus quidam motus est ex vena cava per *Cor* &
 'pulmones in *Arteriam Aortam* : ut in *Quæstionibus*
 'Peripateticis explicavimus. Cum autem in *vigilia*
 'motus caloris nativi fiat extra, scilicet ad sensoria :
 'in Somno autem intra, scilicet ad *Cor* : putandum
 'est in *vigilia* multum spiritus & sanguinis ferri ad ar-
 'terias, inde enim in nervos iter est. In somno au-
 'tem eundem calorem per *venas* reverti ad *Cor*, non
 'per *Arteriam*. Iudicio sunt pulsus, qui expergis-
 'centibus fiunt magni, vehementes, celeres, & cre-
 'bri, cum quadam vibratione : in somno autem
 'parvi, languidi, tardi & rari notante *Galeno*. 3. de
 'caus. pul. 9, 10. Num in Somno calor natus minus
 'vergit in *arterias* : in easdem erumpit vehementius
 'cum expergiscuntur. *Venæ* autem contrario se-
 'modo habent : nam in somno fiunt tumidiore, in
 'vigilia exiliores, ut patet intuenti eas quæ in manu
 'sunt. Transit enim in somno calor natus ex ar-
 'teriis in *venas* per osculorum communionem, quam A-
 'nastomosin vocant, & inde ad *Cor*. Ut autem sangui-
 'nis exundatio ad superiora, & retrocessus ad inferiora
 'ad instar Euripi manifesta est in somno & *vigilia*, sic
 'non

non obscurus est huiusmodi motus in quacunque parte corporis vinculum adhibeatur, aut alia ratione occludantur venae. Cum enim tollitur permeatio, intumescunt rivuli qua parte fluere solent.

From hence it is clear that He held that the blood did circulate continually, falling into the Heart by the *vena Cava*, and issuing out by the *Aorta* into all parts of the body: that this motion of the blood was perceivable by the *Ligatures* at any time, but most manifest in the intumescence of the veins in sleep: at what time also the blood or natural heat (which is all one to him) did pass by way of *Anastomosis* out of the arteries into the veins, as well as at other times. So that we are not to imagine any interrupted circulation in him, but that it did constantly flow night and day, sleeping and waking, though with unequal celerity. In letting of blood he tells us, that the blood which first issues out is venous, and blacker then that which follows, and comes more immediately out of the Arteries. — *Venas cum Arteriis adeo copulari osculis, ut vena secta primum exeat sanguis venalis nigrior, deinde succedat arterialis flavior, quod plerumque contingit.* And he explains the motion of the blood, and natural heat thus, to prevent all ambiguity. *At instabit quis in somno nequaquam prohiberi calorem in cerebro & sensum: pulsant enim arteriae in toto corpore etiam in somno. At praesente calore innato debisset duci in actum facultas animalis. An calor innatus in somno viget in venis & arteriis, non in nervis sine quibus, non sit sensus & motus? Extra igitur ferri est nervos petere, intra autem non solum ad viscera, sed in omnes venas & arterias; unde operationes naturales magis perficiuntur in toto corpore.*

I hope I have now determined the Question which hath occasioned so many heats in the world concerning the Circulation of the blood, who was the first Inventor of it? I have demonstrated that *Andreas Casalpinus*, a rigid Peripatetick upon sensible Experiments & Mechanical considerations, not notional apprehensions, did not only discover this motion of the blood

Qu. Med. l. vi.
qu. 5 fol. 212.
col. 1. lit. c.

Qu. Med. l. 2.
qu. 15. fol.
230. col. 1.
l. c.

(even through the Lungs) but gave it the name of *CIRCULATIO SANGUINIS*; which name is not so proper in itself, considering the *Fabrick* of the veins and arteries, and the *Labyrinth* in which the blood moves universally, describing a *Line* no way circular, as that a man would have pitched upon it in any other *Age* then when *Casalpinus* lived, when the knowledge of the *Learned Languages* was less general then now, and such a barbarous style in fashion, as our *Inventour* used. But it was not so in the days of *Dr. Harvey*, who published his *Treatise* in 4^{to}. at *Francfort* in the year (as I take it) 1628. I must confess I am apt to think upon this consideration, that *Dr. Harvey* (who was a *Peripateticus* Physician, and in whose time at *Padoa*, those Physicians did flourish with the greatest repute of *Learning* and skill in *Anatomy*, as well as *Philosophy*) did take up this opinion from my *Author*. And although there wanted not occasion by reason of what *Walaus*, *Riolanus*, *Slegelius*, and others had said upon the point, for him to declare the original of the discovery, yet in his two Answers to *Riolanus*, and his Book of *Generation*, He no where asserts the *Invention* so to himself, as to deny that he had the intimation or notion from *Casalpinus*; but leaves the *Controversy* in the dark: which silence of his I take for a tacite Confession. His Ambition of *Glory* made him willing to be thought the *Author* of a *Paradox* he had so illustrated, and brought upon the Stage, when it lay unregarded, and in all probability buried in oblivion. Yet such was his Modesty, as not to vindicate it to himself by telling a Lie. And such his Prudence, as rather to avoid the debate, then resolve it to his prejudice. Had *Dr. Harvey* been a Chymist, I should have guessed that he might have fixed upon the word *Circulation*, upon other reasons, and those congruous enough to his *Hypotheses*: but since (especially in the

days when he writ) those *Studies* were unknown to him, and not valued by him, I am inclined to think that He did receive his first Intelligence from this Professor at *Pisa* (where *Harvey* also was) and so improved those hints,

that

Narravit mihi. Nobiliss. & Ampliss. Nicolaus Oudart, Illustrissimi Principis Auriaci Confiliarius, meminisse se audire ipsum *Harveium* profitentem se revera primum circuitus sanguinis auctorem, & in eum de ratione viventium inquirendi occasionem ex *Hierio* accepisse. Fuit is serenissimi quondam Regis Jacobi generarius, & Ma-

that in the divulging of his *Opinion*, they are as little to be seen, as the first *indeclinable* which *Painters* draw in *Po-Elure*: that are lost, when the *Poustrait* is finished: or as in the first *Appearances* of *Plants* above-ground, where those *leaves* and *buds*, which often give growth to the succeeding *stemme*, *flower*, and *fruit*, are lost, or altered so

as not to be known. Let it suffice, that *Dr. Harvey* had parts and industry enough to have discovered it, had he not been prevented therein. And I should have imagined that our *Countryman* had found it out, without any communication with those other Books (a thing possible enough, and of which we have instances in the case of *Rudbak*, *Bartholine*, and *Jolice*) but that the reasons I have alledged render the case suspicious. Had *Casalpinus* writ a distinct *Treatise*, I doubt not but much of the *Glory* had been his: since there are as great differences between one *Circulator*, and another, and greater, then betwixt him and *Harvey*: but his notions being confusedly laid down here and there in his *Peripatetick* and *Medicinal Questions*, and he being not ambitious to pretend to any new discoveries, only to illustrate *Aristotles* tenets: I shall allow *Harvey* the possession of his present reputation: nor do I give my self this trouble of collecting up into a method these confused assertions of *Casalpinus* out of any envy to the dead, but out of animosity to Pretenders to Wit and Learning, that brave it thus amongst us; yet if to be ignorant of what hath passed in the world heretofore, be an argument of childishness, there is not anything more puerile then this sort of *Virtuosi*.

I might not dismiss my Reader, but that the great noise which this *Circulation of blood* makes in the World, enforceth me to speak a little more about the utility of this discovery, which our *Author* describes to be the most noble of all those discoveries in the Oeconomy of humane nature, which Wit and Industry have made. I do confess I think the Arguments for it to be such as admit of no Answer in general;

theſeot perium, eoque nomine Londi ni celebris. Si verum hoc, verisimilius quoque est, vel ipsum, vel Serpium, vel Heriolum, a Casalpinio accepisse. Nemo enim mihi persuaserit, ab eorum nemine visum fuisse scriptum [veretis impressum] quod vel titulo se, sedum eruditionis varietate atque sublimitate commendat. Jo. Artor. Vander Linden diſpoſ. de circuit. sangu. exercit. 9. ſect. 196. & exercit. 16. ſect. 182.

but when we come to debate *how it passeth through the Lungs*, (which *Riolanus* almost invincibly disproves) or *through the Septum Cordis*, (which *Riolan* and *Bartholin* asserts, but *Harvey*, *Slegelius*, *Vander Linden*, and others, reject it on good grounds) what it is that causeth the pulsation of the Heart? what continues on the motion of the blood in the veins, even when a *Ligature* is made betwixt the antecedent and subsequent blood. Whether the blood be diffused into the habit of the body, and reimbibed by capillary veins, or conveyed on by *Anastomoses*? whether there be any difference betwixt the venous and Arterious blood? How the Phenomena (which undeniably are observed) about the pulse can be made out; and particularly how some have lived without any Pulse, others (which I have known) in the palpitation of the Heart, suffer no change in their Pulse? How upon dissection or wounds sometimes both ends of the veine divided do bleed? How some bleed at the arme without any *Ligature*; some upon a double *Ligature*? These, and many other questions, when I come to dispute with my self, methinks I am forced to constrain my judgement in the assent I give to that Probleme: and what I am ashamed to deny; I finde I cannot own without some reluctancy, which is daily increased in me by scruples arising from the *Practick Part of Physick*; nor do I blush to declare my self an Abettour only of such Tenets, as are consistent with, and illustrated by *Practical Physick*: it was thought at first that this *Circulation of blood* would overthrow all the usual *Methods of Physick*, and introduce new and beneficial discoveries in that part of *Medicine* which is *Therapeutick*. But *Harvey* denieth that it varieth the *Medicine of the Ancients*; and *Slegelius* asserts the same opinion, avowing it to be rather an happy illustration, then a subversion of the former praxis, though it alter the Theory much. In fine, those little advantages and *Diversities*, which we derive from that *Invention* merit not our notice; nay, any man shall with more assurance bleed in many diseases in sundry manners and different places, upon diverse indications upon the old observations and rules, then on the new hypotheses, wherein as to the use of parts, and nature of humors, there

is as little of cleanness and certainty; as there is efficacy in that practice, which is regulated most thereby.

I had forgot to take notice of the *vena lactea* ascribed to *Asellius*, the invention of them is thought a great discovery, and such as signifieth a man in this Age. Yet even those vessels were known to *Galen*, as *Nardius* proveth out of his book against *Brassistratus*, c. 5. and out of the last chapter of his *Anatomical Administrations*. It is true, he calls them *Arteries*; he saith they were in the *Mesentery* filled with *Milk*, and that he observed them in young *Kids*. And *Hofman* in his *Varia Lectiones* doth produce out of *Galen*, de usu part. l. 4. sect. 19. a place so evidently shewing that *Galen* and *Herophilus* did recover those *Vena lactea*; that *Veslingius* cries out in a Letter to him, *Existimo aut nihil cum Herophilo Galenum vidisse, aut has* ἰδία: μεσεντερικὰ φλέβας, *hos*

Nardius,
not *Genial*,
4. p. 411.

ipso ductus esse, quos lacteos cum Asellio nominamus. Quae ad Pancreatis adenoῖδῃ σώματα (ex multarum enim glandularum compage constructum videtur) pertinent. The place in *Galen* is this, as *Hofman* represents it. πρῶτον μὲν ὅτι παντὶ τῷ μεσεντερικῷ φλέβᾳ: ἐκείνην ἰδίας, ἀνεκσυμμάχας αὐτῶν τῇ σπλάχνῃ ἢ ἐντέροι, μὴ περαιτέρω εἰς τὸ ἥπαρ ὡς αἱ Ἡρόφιλος ἔλεγε: εἰς ἀδενώδη τινὰ σώματα τελευτῶσιν αὐτὰ αἱ φλέβαι, ὥς ἄλλων ἀπέκκων ὅτι τὰ κύλα: φρεσῶν. Which proof as it is p: r: spicuous enough to ruine the discovery of the *Vena Lactea*, and the deducing of them unto the *Glandules* of the *Mesentery* (beyond which *Herophilus* and *Galen* did never trace the journey of the *Chyle*, but imagined those veins to nourish the *Mesentery*) so I think that the invention of the *Ductus Thoracicus* belongs to *Andr. Vesalius*, and *Barthol. Eustachius*: the one more obscurely proposeth it, the other more openly.

Epist. xxi.

C. Hofman
var lect. l. 1. c. 2.

Andr. Vesalius de fabrica corporis humani l. 3 c. 7.

p. 291. Edit. Vener. 1568.

— *Adeo ut mihi etiam persuasum sit, quamvis id nunquam viderim; interdum a sinistro coxae caudicis latere, ubi jugulum contingit, venam depromi, quae secundum sinistram vertebrae cum latus decubitis ducta, sinistris costis samos offerat: illa quam sine pari nuncupamus, dextras costas alente. Atque huiusmodi vena ortum, non tantum a jugulo primum posse fieri,*

7. Ant. Van
der Lind n
de circum-
sangu. ex. re. 9

“sed paulo infernis, etiam agnus attestatur: in quo tale aliquid
“semel observavi.

“Viden’ venisse in rem, & quasi in manu jam habuisse il-
“lud Ariadnæ filum, quod secutus penetrare in naturæ La-
“byrinthum, majoremque sibi gloriam comparare potuif-
“set? sed quo fructu? Audi sis, & disce, quam homini, sci-
“entias sectanti, necessarium sit, etiam in naturalibus cum,
“qui sui juris & muneris fecit, docere homines scientias &
“artes, Ps 94. v. 10. Jer. 28. v. 26, precari, Revela oculos
“meos ut cernam mirabilia in operibus tuis, ex Ps. 139. v. 18.

“Verum, inquit, ejusmodi non nisi rarissime occurrentes ve-
“narum series, anatomes studioso non aliter expendendas pu-
“tarim, quam si interdum sextus in manu digitus, aliud ne mon-
“struosum se spectandum offerret. Adeo ut si quando in publicis
“sectionibus hac observo, ea tanquam non essent, tacite præter-
“eamne artis candidati in omnibus corporibus hac observari ar-
“bitrentur.

“Quanto egregius, & propter hoc non unam atque im-
“mortalem laudem meritus Barth. Eustachius: qui non so-
“lum candide exponit, quod vidit; sed et præmissis, quod res
“merebatur, præloquio conatus est posteriorem studia ex-
“citare ad ulteriorem inquisitionem et perfectiorem cogni-
“tionem. Neque enim ignorabat, rei quidem inventionem, &
“intus munus esse: at vero ejus plenam cognitionem &
“intus opus esse. Sed audiamus ipsum.

“Ad hanc naturæ providentiam quandam equorum venam a-
“lias pertinere credidi: quæ cum artificii & admirationis plena
“sit, nec delectatione ac fructu careat: quamvis minime sit ad
“Thoracem alendum instituta: opera pretium est ut exponatur.
“Itaq; in istis animantibus, pergit ab hoc ipsa insigni trunco sini-
“stri juguli, quæ posterior sedes radicū venæ internæ jugularis
“spectat, magna quadam propago germinat: quæ præterquam
“quod in ejus origine ostiolum semi-circulare habet, est etiam
“ALBA ET AQUÆ HUMORIS PLENA; nec longe ab
“ortu in duas partes scinditur; paulo post rursus cocuntes in u-
“nam: quæ nullos ramos diffundens, juxta sinistram vertebra-
“rum latus, penetrato septo transverso, deorsum ad medium usq;
“lumborum fertur: quæ latior efferta, magnamq; arteriam cir-
“complexa, obscurissimum finem, nihilq; adhuc non bene perce-
“ptum, obtinet.

Since

Since the writing hereof, I have met with a book containing certain Letters of *Marcellus Malpighius*, and *Carolus Fracassatus*; in which it is observable that *Fracassatus* (the Anatomy-Professour at Pisa) doth ascribe the Invention of the Circulation of the blood to *Casalpinus*; and of the *ductus Thoracicus* to *Eustachius*: His words are these: "*Adeo oscitantia Autorum quadam tam male proponuntur, ac tanguntur, ut oporteat alios eadem repetere, ac disare novis elucubrationibus, ac si nunquam fuissent. Sanguinis Circulatio, Galaxia in Microcosmo humano, scilicet via Chyli Cor, nonne Casalpinum agnoscit Authorem, ac Eustachium de vena sine pari? Et tamen soles in Scholis Autores crepare Anglos Harvzum, & Dispenfes Pecquetos: non tamen spernendi, qui verum rudimenta ponunt, etiamsi infecto nec absoluto opere cessaverint: qui invenit anticipavit laborem & curam quarendi: & ad minora vocatur, si quaestionis sollicitudo & jactatio tollatur: par tamen decus manet & illum, qui primum invenit, & qui postremum perfecit, nescio anim an praestet invenisse, an disasse.*"

*Fracassatus
de cerebro.
p. 202.*

Having said thus much, I leave Mr. *Glanvill*, to answer those little quilllets of his, which can convince none but Shallow-brain'd and Comical Wits. — "If they knew these grand Theories formerly; how chanceth it that they speak no more of things, which no doubt they had frequent occasions to mention? How come they to be left without memory among their followers, who were such superstitious porers upon their writings? How chanceth it not to have been shewn to be lodged in those Authors before the days of Dr. *Harvey*, &c. when Envy had impregnated and determined their imaginations? Let illiterate persons and Mathematicians be swayed against plain proof by these Arguments. I think in stead of Temples and Altars to be erected to these Inventors, there is more need of a Schoolmaster and an Antiquary, the one to teach them humane learning, the other to instruct them in past discoveries; least, with much trouble and pains our new Philosophers should finde out again the Art of Printing, or Etching: the use of Gunpowder, or the Load-stone.

Of

Of Transfusion of Blood-- into Animals.

Plus Ultra.
pag. 17.

“ **T**Hus, Sir, I have done with Instances of Anatomical
“ Advancements, unless I should hitherto referre the
“ late noble Experiment of Transfusion of the Blood,
“ from one living Animal into another, which I think very fit to
“ be mentioned; and I suppose it is not improper for this place:
“ Or however, I shall rather venture the danger of impropriety
“ and misplacing, then omit the taking notice of so excellent
“ a Discovery, which no doubt future Ingenuity and Practice
“ will improve to Purposes not yet thought of; and we have very
“ great likelihood of advantages from it in present Pro-
“ spect.

“ For it is concluded, That the greatest part of our diseases,
“ arise either from the scarcity, or malignant tempers and
“ corruptions of our Blood; in which cases Transfusion is an
“ obvious Remedy; and in the way of this Operation the pec-
“ cant blood may be drawn out, without the danger of too much
“ enfeebling Nature, which is the grand inconvenience of meer
“ Phlebotomies. So that this Experiment may be of excel-
“ lent use, when Custom and Acquaintance have hardened men
“ to permit the Practice in Pleurisies, Cancers, Leprosies,
“ Madness, Ulcers, Small-Pox, Dotage, and all such like
“ Distempers. And I know not why that of injecting prepared
“ Medicines immediately into the blood, may not be better and
“ more efficacious then the ordinary course of Practice: Since
“ this will prevent all the danger of frustration from the loath-
“ ings of the Stomach, and the disabling, clogging mixtures
“ and alterations they meet with there, and in the intestines, in
“ which no doubt much of the spirit and virtue is lost. But in
“ the way of immediate injection they are kept intire, all those
“ inconveniences are avoided, and the Operation is like to
“ be more speedy and successful. Both these noble Experi-
“ ments are the late Inventions of the **ROYAL SOCIETY**,

"who have attested the reality of the former, that of Transfusion
 "of Blood by numerous trials on several sorts of brute Ani-
 "mals. Indeed the French made the Experiment first upon
 "humane Bodies, of which we have a good account from Moun-
 "sieur Dennis. But it hath been practised also with fair
 "and encouraging success by our Philosophical Society. The
 "other of injection, if it may be mentioned as a different in-
 "vention, was also the Product of some generous Inventors;
 "though indeed more forward Forreigners have endeavoured
 "to usurp the Credit of both. This latter likewise hath suc-
 "ceeded to considerable good effects in some new Trials that
 "have been made of it in Dantzick, as appears in a Letter
 "written from Dr. Fabricius of that City, and Printed in the
 "Philosophical Translations.

I shall not quarrel with Mr. Glanvill for misplacing this
 discourse about the Transfusion of Blood, but I think all the
 World will condemn him for ascribing either the invention
 of Transfusing blood, or of injecting Medicaments into the
 veins, unto the Society. That the latter was a thing much
 practised by Dr. Wren and others in Oxford, before the Re-
 storation of his Majesty, and before that ever the SOCIETY
 was thought upon, is a thing known to all that were at those
 days in that University. I saw my self in those days the
 Dog into whose veins there was injected a Solution of Opium,
 at the Lodgings of the Honourable Robert Boyle, of which
 he makes mention in his second discourse of the Usefulness
 of Natural Philosophy, and Borrichius in his Letters to Bar-
 tholinus.

As for that other of Transfusing the blood out of one Animal
 into another, if the Question be who first proposed it into the
 World to be tried, it is certain that Libavius first did that, at
 least I know not any more ancient than He. That Learned
 man above Fifty years ago, so plainly describes the Transfu-
 sion, that one can hardly discourse of it with more clearness,
 then there is done in these words. *Adsit Juvenis robustus, sa-
 nus, sanguine spirituosus plenus: Adsit exhaustus viribus, tenuis,
 macilentus, vix animam trabens. Magister Artis habeat tu-
 bulos argenteos inter se congruentes, aperiat arteriam robusti &*

Those For-
 eigners will
 rectify here-
 after their
 mistakes, and
 not attribute
 the injecting
 of Medica-
 ments to their
 invention as
 Caspar Sebat-
 ius in Mirab.
 Art. I. xi. c.
 21. p. 801. &
 Phil. Jac.
 Sack, in O-
 ccan Micro-
 microscop.
 sect. 55 have
 done, unjust-
 ly magnify-
 ing & elevat-
 ing Indu-
 striam & Ex-
 perimentum of
 these Preten-
 ders
 Andr. Lissav.
 de sens. Syn-
 tagm. arca-
 nor. adv. Hen-
 ning. Schen-
 nem. act. 2.
 c. pag. 2. e.
 dit. Franco-
 furt. A. 1613.

tubulum

tubulum inserat, muniatque mox & agroti arteriam findat, & tubulum foemineum infigat: jam duos tubulos sibi mutuo applicet, & ex sano sanguis arterialis, calens & spirituosus saliet in agrotum, unaque vita fontem afferet, omnemque languorem pellet. This allegation was made use of by an Italian Philosopher, and silenceth all those in England, or France, that pretend to the *Glory* of having first proposed: So that the Author of the *Philosophical Transactions* confesseth it in these words". This indeed is clear enough, and obligeth us to averre a greater *Antiquity* of this operation, then before we were aware of, though 'tis true, *Libavius* did not propose it, but only to mock at it (which is the common fate of new *Inventions* in their Cradle) besides that, He contrives it with great danger both to the *Recipient* and *Emissent*, by proposing to open *Arteries* in both, which indeed may be practised upon *Brutes*, but ought by no means upon *Man*. Till that learned *Italian* had instructed the *Virtuosi* in the point, there had been a great Controversie agitated between the *French* and *English Societies* about the *Invention*. The former pretended, that it was mentioned first amongst them about eleven years ago, at the Assembly, in the house of *Monsieur de Montmort* and that the publick is beholding to that *Monsieur* for this discovery, and the benefits and advantages that shall be reaped thereby. But about the person that should first mention the design, the *French* vary. *Monsieur de Gury* fathers it upon the *Abbot Bourdelot*: but the Author of their *Journals* upon a *Benedictine Friar*. Our Society having given the world occasion to take notice of it publickly, and having otherwise long before pursued the *Oxford Invention* of injecting *Liquors* into the veins, thought themselves injured in this, that the *French* should usurp the Credit of such a discovery as had its first birth in *England*, upon a pretence that it was conceived in *France*: it being notorious, the *French* took occasion to try it by the Example of the *English Virtuosi*: and there being no publick record cited, declaring the time and place of the *Invention* proposed the Method to practise it. and the success of the *Execution* Thereupon began a *Paper-scuffle* betwixt the *Gazettiers* of the

Philos. Transf.
act, Numb. 37.
p. 740.

By his leave
it infers, only
the mention
of it to be
more ancient,
not the Ope-
ration.
Libavius pro-
poseth it out
of some Para-
cellian Magi-
cal Writer,
and not
from his own
Fancy: ad-
ding that the
Physician
who practi-
seth this Trans-
fusion, deciev-
eth himself.
See Mr. J.
Denny's Let-
ter in the
Transf.
numb. 27.
ib. numb 28

the *Curiosse* which any man may reade with some pleasure, because they had on both sides such little *Logick*, as to argue from the mentioning of a design, to the effecting it. If the way of *Argumentation* be good and solid, then *Aristotle*, and such of the *Ancients*, as proposed the *squaring of the Circle*, must not be denied the glory of being *Inventors* of it: So they which first proposed a *perpetual motion*, or the *North-west Passage*, may go for *Inventors* of them: yet are none of these things yet discovered. Oh! new *Correlates*, and worthy of our *Inventors*! Long ago *Aristotle* and the *Common Dialecticks* told us, *Datur scibile de quo non datur Scientia*. But none like our *Anti-Logicians* ever taught, there were a sort of *Inventors* whose *Inventions* were yet to seek. All that our *Inventors* did, was, that after *Dr. Lower* had first discovered and practised the *Transfusion* at *Oxford* in *February 1665*. They on the *seventeenth* of *May* following 1665. gave order that there should be trials made for *transfusing* the blood: but their trials proving lame for want of a fit *Apparatus*, and a well continued *Method of Operation*: the *Dr.* sent them a convenient *Method* for effecting the thing. Before this, there never was any mention or proposal made at the *Society* concerning the *Transfusion*, as I am certainly informed by one of their *Number*, who hath examined their *Journal-Books*, in which such *Proposals* and *Experiments* are recorded. Nay, they were so far from pretending to it at first, that when it was mentioned unto them by *Mr. Boyle*, there were some as well severe as ingenuous *Criticks*, who thought it somewhat strange and bold for him to affirm that the *Dr.* had made it succeed. And besides, I observe that *Mr. Boyle* in his *Letter* to *Dr. Lower* (who hath vindicated the *Invention* to himself in his late *Book de Cordis*) doth not say that ever the *Society* had thought of or attempted, or designed to attempt the thing. He calls it *insolitum & insperatum concumen*. *June 26. 1666.* and desires He would acquaint the *Society* with the manner how he atchieved it. Now since that neither was *Dr. Lower* then of the *Society*, nor any way entitles them unto it, but himself, and that in a *Treatise* wherein he doth not so much as call him-

See Transf. N^{um.} 28. pag. 524.

In the *Transactions* numb. 37. pag. 371. The *Gazetier* affirms, that upon further investigation it was by good proof (which is in his hands) prov'd that the invention had been known to some ingenious persons in England thirty years ago. If so, then it is not the Society the Inventors of it, except we will say, that Societies as well as individual fix'd do pre-exist? But may not a man ask our *Gazetier*, where is the publick record of this invention? what Account is there of the Method with which it was practis'd? with what success? How comes all this to be conceal'd till after Dr. Lower achieves it, and the French pretend to it? would any man have conceal'd their claim to the Discovery, after that it was become the talk of Europe, the Darling of the Society, and worthy to be disputed for by the French? why did they not put in their Claim, being within hearing, till about three years after,

self a *Member* of that Assembly, let any man judge with how much truth this other *Discovery* is ascribed to these **NEW EXPERIMENTATORS**, by our *Virtuoso*. But least I should seem to deal too severely and maliciously with them, rather then it shall be said That they invented nothing, I grant, that They invented a *LTE*; and shall conclude the Debate by representing the words out of their *Transactions*, by which they assume to themselves the Credit of the Invention, and by a dubious wording and pointing of the Period, insinuate as if Dr. Lower as well as Dr. King had been encouraged to the Attempt by the Society.

Philosoph. Transact. Numb. 27. pag. 490.

"How long soever that Experiment may have been conceived in other parts (which is needless to contest) it is notorious that it had its Birth first of all in England; some ingenious persons of the Royal Society, having first started it there, several years ago, (as appears by their Journal) and that dextrous Anatomist, Dr. Lower, reduced it into practice, both by contriving a Method for the Operation, and by successfully executing the same, wherein he was soon overtaken by several happy Trials of the skilful hand of Dr. Edmund King, and others encouraged thereunto, by the said Society, which being notified to the World Numb. 6. 19. & 20. of these *Transactions* printed Novemb. 19. & Decemb. 17. 1666. the Experiment was soon after that time heard of to have been tried in foreign Parts, without hearing any thing of its having been conceived ten years ago.

In which relation, I must take notice that it doth not really appear in their *Journal-books*, that ever any such thing was started by any persons how ingenious soever of their Society; Dr. Lower being not then, nor long after in the History of the Royal Society reckoned as a *Member* of it. Next
tha

that the *interpunction* of the period is so *equivocally* placed and penned, that the *an wary Reader* may think that Dr. Lower, as well as the *others* was encouraged to the *trial* by the *Society*. Whereas *he* was not, whatever the *others* were. Again, it is *disingeniously* said, that *he* was soon overtaken by *several happy Trials* of Dr. Edmund King, and others, encouraged thereto by the *Society*. Since it appears by the letter of Mr. Boyle, that the *Society* knew not how to do the thing in *June*, which Dr. Lower had effected in *February*, and the fame thereof at that time was spread over *England*. In *July* Dr. Lower acquainted the *Society* with the *manner of the Transfusion*, whereof Dr. Wallis had given the *Society* an imperfect account a little before of what he had seen Dr. Lower do at *Oxford*. So that for at least *four or five months*, the *Members* of the *Society* did not overtake Dr. Lower. But after *they were acquainted with the contrivance*, they invented it *very clearly*.

From hence it is easie for any man to judge with how much right Mr. Glanvill doth say, that both the *injecting of Medicines*, and *transfusing blood into the veins of Animals*, those *Noble Experiments* were the *late Inventions of the SOCIETY*. I shall now proceed to inquire into the *Utility of them*; thereby to discover how *noble and excellent* they are, and what *advantages* we may hope to derive from them hereafter.

Because this *Transfusing of blood* hath hitherto been looked on as the *primary Invention*, and the most *famed* of any the *Society* were ever intitled unto: and that they *themselves* have particularly concerned themselves in asserting it to be their *discovery*, to the end that every *Reader* may the better be able to judge of the *Controversie*, without being forced to go seek out amongst the scattered *transactions* and elsewhere, several *Histories* that are material to the passing a right judgement; I shall crave pardon if I do relate particularly the matter of *fact*. and what hath been sundry times performed by the *English, Italian and French Virtuosi*, with every circumstance, both as to *injecting of Medicines*, and of *blood into the veins*.

As to the *injecting of Medicaments into the veins*, it is an *Experiment* that I am apt to think was first tried by the *English*, and as a *curiosity*, it was not *unpleasant*; but that it should be so advantageous a discovery as *Mr. Glanvill* represents it is like to be, I do not believe. There was a time when men had regard to their *Consciences*, and what could not be administered but upon *prudential hopes* of advantage to the *Patient*, no approved *Physician* durst, or would give to any sick person: but in this *Age* such as ought to protest against it, are as forward as any to forget these *considerations*, and prompt men on to practices without either regarding whether the effect be not *Murther* in the *Physicians*, besides the ill consequences to the *diseased*. In the *injecting of Medicaments*, I must complain that neither the *Operation of Medicaments immediately injected into the blood and veins* is known, nor the *dose*; and consequently the *Project* not like to improve *Physick* at all, unless our *Magistrates* will licence men to try so many *Experiments*, even to the apparent hazard or certain death of the parties, and may regulate and authenticate the practice in such manner as becomes a *Baconical Experiment*: and to encourage *Rational men* to this procedure, there ought to be a greater *deficiency* in *Physick*, then yet appears, and a more *hopeful success* then any man can yet expect, supposed by this way. A *Paynim* told us,

Nulla unquam de morte hominis cunctatio longa est.

A sober *Physician* will look upon the act to be as indifferent, as the *Comedian* describes love to be, *Quares in se neque consilium, neque modum habet ullum, eam consilio regere non potes*. That there is no probability that this way of *Medicine* can ever amount to any thing, appears from this consideration, that *Liquors immediately injected into the blood*, have a different *Operation* there, then when taken in by the *Stomach*: and that the mixtures of *Liquors* with blood upon *Pblebotomy* in a *Pottinger*, gives no light to the *Experiment*. As I shall now shew.

Seignior Fracassati Professor of *Anatomy* at *Pisa* tiled these

these Experiments by injecting Medicaments.

1. Having injected into the *jugular* and *crural* veins of a Dog some *Aqua fortis* diluted, the Animal died presently: and being opened, all the blood in the vessels was coagulated and fixed: but that which was in the *Viscera* (which I dare not English *Guts*, but take it to denote the *Heart*, *Liver*, *Lungs*, *Spleen*, where the blood passes extravasated through: though the *Transactions* render it *Guts*, and destroy the antithesis betwixt *vasa* and *viscera*) did not so easily coagulate. It was also observed that the great vessels were burst, or as it were cut asunder, yet have I known who hath put *Aqua fortis* into cooling Fuleps in Fevers, as others do *Spirit of Vitriol* without any harm.

Transact.
num. 27. p.
490 451.

Cor. Fracaf.
fac. Ep. Anat.
de cerebro.
p. 252. 253.
54.

2. There was also infused into another Dog, some *Spirit of Vitriol*, which had not so present an effect: for the Animal complained a great while, and foamed like *Epilepticks*, and had its respiration very thick: and observing the beating of his breast, one might easily judge, the Dog suffered much: who dying at last, his blood was found fixed in the veins, and grumous, resembling *Soot*: whereas in the Experiment with *Aqua fortis* (which may as easily be given inwardly as *Spirit of Nitre*) the blood is not said to have been changed in its colour from other coagulated blood. It was also observable (though the *Transactions* minde it not) that the blood in this last Dog was not upon coagulation continuous in the veins, but broken and severed into parcels.

3. There was also injected into the *jugular* of another dog, some oyle of *Sulphur per campanam*, but he died not of it, though this infusion was several times tried on him. And the wound being closed, and the dog let go, he went into all the corners of the room, searching for meat, and having found some bones, he fell to gnawing them with a strange avidity, as if this *Liquor* had caused in him a great appetite.

4. Another dog, into whose veins some Oyle of *Tartar per deliquium* was injected, did not escape so well: for he complained much, and was altogether swoln; and then died: Being opened, the Spectators were surpris'd to finde his
blood

blood not *turbled*, but on the contrary more *thin* and *florid* than ordinary.

Dr. Lower
de morbo Cor-
dis pag. 1. 9.

Transact.
num. 27. pag.
49.

5. Dr. Lower having extracted half a pound of blood out of the *crural urine* of a *Mastiff dog*, did inject the like quantity of warm *milk* into him; within half an hour the *dog* became very *sick*, breathed with difficulty, and seemed to labour much with his *heart* and *diaphragme*, and after to palpitate, tremble and sigh grievously, and at length miserably died. Upon dissection he found the *vena cava*, the ventricles of the *heart*, the vessels of the *Lungs*, and the *Aorta* full of blood and milk *coagulated* together, and the *concretion* was so hard, that it was not easie to part it. This he tried but once. But *Monfieur Denny*s the *French Physician* saith, he tried it with a different success. For having syringed about a quarter of a pint of *milk* into the *veins* of an *Animal* (he tells not *what*) and having opened the same some time after, he found the *milk* so perfectly mixed with the blood, that there was not any place in which appeared the least footstep of the *whiteness* of the *milk*, and all the blood was generally more *liquid*, and less apt to *coagulate*.

Mr. Boyle of
the Usefulness
of Nat. Phil-
los. part. 2. p.
54, 55.

6. I received an account of some Experiments, from one much versed in these *injections* (which he may one day acquaint the world with) to this effect. That the infusion of *Crocus Metallorum*, injected in a less quantity than otherwise (*viz.* $\frac{3}{4}$) will work by vomit in a *dog*, almost presently, and very strangely, and make him grievously sick. Yet Dr. *Wren* informs Mr. Boyle, that a moderate dose of the infusion of *Crocus Metallorum* did not much move the *dog* that he injected it into: but a large dose of *two ounces* or more wrought soon, and so violently, that he vomited up life and all. That a *dog* will take two drams of *Opium* into his *Stomack*, and seem never the worse, if you keep him from lying down half an hour after; but *two drams* of *Poppy-seeds* made into an *Emulsion*, and injected into his *veins*, will kill him presently.

Vid. supra
P 53. 54

7. Mr. Boyle saith, that he conveyed a small dose of the *tincture* of *Opium* into a *dog* this way, which began to work so speedily upon the *brain*, that he was scarce untied before the

the *Opium* began to disclose its *Narcotick* quality; and almost as soon as he was upon his feet, he began to nod with his head, and reel and falter in his place; but being kept awake, and in motion, by whipping up and down the Garden, after some time he came to himself again, and not only recovered but began to grow fat so manifestly, that 'twas admired.

8. A certain *German Count* coming into *England*, relates an Experiment, which he saw in the presence of *Pr. Rupert*. After some blood taken from a dog, there was injected into him a small quantity (*portuncula*) of *Spanish wine*; within sometime after the dog was perfectly drunk, being giddy, performing sundry ridiculous actions, then vomiting with a profound sleep.

Phil. Yac. Sachs in Ocean. macro. microcosm. l. 155.

9. *Dr. Fabricius* Physician to the City of *Dantzick* injected purgatives into humane bodies, with this effect. A strong bodied *Souldier* being dangerously infected with the *Pox*, and having grievous protuberations of the bones in his arms, two drams of a purgative liquor were injected: he presently complained of great pains in his elbows, and the little valves of his arm did swell so visibly, that it was necessary by a great compression on's fingers to stroke up that swelling towards the Patients shoulders. Some four hours after it began to work, not very troublesomely; and so it did the next day, in so much that the man had five good stools with it. Without any other remedies those protuberances were gone, nor are there any footsteps of the disease left. Two other trials were made upon women, the one a married woman of 35, the other a *Servant-maid* of 20 years old: both from the birth had been grievously troubled with *Epileptick Fits*, so that there was little hopes of curing them. There was injected into their veins a laxative rosin, dissolved in an *Antiepileptical spirit*; the first of these had gentle stools, some hours after the injection; and the next day the *Fits* recurred now and then, but much milder; and are since quite vanished. The *Maid*, she went the same day to stool four times, and several times the next: but by going into the Air, and taking cold, and not observing any diet, cast her self away. 'Tis remarkable, that it was common to all three, to vomit soon after the injection, and that extremely, and frequently.

Transact. Antiqu. 30. pag. 554. 555.

I have

I have not time to adde any more of these kind of *Trials*: but from hence it is evident, that things *operate* (where they do operate in the same manner) in a lesser *dose*, than when

taken into the *Stomach*, and with more *violence*. That oftentimes such things as are *innocently* taken in to the *Stomach*, are mortal when *injected* immediately into the *blood*. That although learned *Physicians* have made *little* or *no* difference betwixt the operation of *Oyle of Sulphur*, and that of *Vitriol*, yet by this *Experiment* there is found to be a quite different effect. So the *Salt of Tartar* (which is as innocent as

Vulgo hactenus a non paucis species Vitrioli, & Sulphuris pro diversis rebus habiti sunt adeo quidem ut nonnulli illius Sulphuris & acidum ad eosdem pulmonis morbos exhiberent: sed valde impetite cum acida omnia sint vitrii inimica, & spiritus Sulphuris & Vitrii si essentia nulli modo differant, sed ex eadem re generentur, & parentur. Etenim spiritus Vitrioli & Sulphuris eundem saporem, colorem & omnino easdem qualitates & effectus habent, & ad eosdem usus in medicina adhibentur: nondumque inventus est, qui peculiarem aliquam, seu manifestam seu occultam qualitatem in spiritu Sulphuris monstrare poterit, quia non etiam in spiritu Vitrioli sit. Sennert. in Paralipomen. ad insulat. 7. 5 part. 3 sect. 3 c. 5.

Salt of Wormwood, or any such *Salt*) had a pernicious effect upon the *dog*, though *discrepant* from the others.

As to the *Experiments* of *Dr. Fabritius*, they do not give much of *Encouragement* to the *Trial*, for the one died which had the most of *youth*; and though her death be attributed to other circumstances and neglects, yet either those are *trivial*, or for some (*unknown*) length of time there must be greater care than ordinarily after *Physick*, otherwise small accidents become mortal. And the *extreme* and frequent *vomitings* (which here happen from the sufferings of the *Heart*, and not the *Stomack*) render the course more *hazardous* to tender *Stomachs*, and weak *Constitutions*, then *Mr. Glanvill* suggests. So that the *loathings of the Stomach* are not prevented by this way, nor the success very *inviting* (how speedy soever) upon those *Experiments* any more than from the *Churlish Physick* of the ancient and moderate *Chymists* of *Mr. Odored's* party, which *wise-men* will not imitate. I wonder the *laxative Solutions* were not set down that we might judge of their strength: and that the way of dieting and ordering of them afterwards was omitted: whereas the knowledge thereof might avail to prevent the ill consequence which befel the *Maid*.

I shall now consider the effects which the several *Liquors* have

have upon a mixture with the blood, when taken warm in a *Pottinger*, and those affused to it. This is a Practice which the Honourable Mr. Robert Boyle imparted to the Royal Society in December 1664. and thinks that *Fracassati* may have taken his hint from it, to inject those Liquors: but I finde a Letter from *Leyden* sent to *Boribalinus*, Dated Jan. 9. 1662. in which there are several Experiments of that kind, which I shall set down presently. If I placed any great value upon the Experiment, I could put in for the Practiser of it at *Stratford upon Avon* in 1660. and prove that I made some Solutions of Salt of *Asb*, Salt of *Wormwood*, and Salt of *Tartar*, and received the blood of sheep into the glasses in which they were, to try the differences betwixt those Salts, whether they were of the same nature (so that it was indifferent whether one used Salt of *Wormwood*, *Carduus Benedictus*, *Tarrow*, or *Mugwort*) or that there were any difference. Which last *Angela Sala* denies, though other *Chymists* affirm it. But after that I had enquired into that Controversie by several ways, I went to *Jamaica* and neglected the Experiment. But since that I see that every unprofitable trifle, becomes a famous and noble Experiment, and if it bring no present Emolument, yet at least it becomes *Luciferous*, and (as they say) puts us in the Prospect of several great advantages; at least, more and greater things will be disclosed by it, when future ingenuity and diligence hath improved and perfected the invention. Since that time I have made many Essays about the mixture of sundry Liquors, with the blood of Sheep, Lambs, Calves, Cows, Oxen, Hogs, Poultry, and that in several manners.

Angelus Sala
Tartaralog.
ect. 3 c. 1. p.
133.

I have received the blood of several creatures upon warm solutions of sundry Salts, of *Allom*, impure *Salt-peter*, *Sal Prunella*, Salt of *Nitre*, upon solution of the several *Vitriols*; upon *Steel wine*, *Vomitive wine*, *Sack*, *French wine*, and *Malaga*, upon *Spirit of wine*, *Spirit of Cider*, and *Spirit of the grounds of Beer*; upon warm *Urme*, upon mixtures with *Spirit of Vitriol*, and *oyle of Sulphur*, and *Juice of Lemons*, and *Oranges*, upon the rare liquor of *Salt-peter*; upon it, after it hath passed the *Asbes*, and upon the *Mothers* of it, and many other trials with *oyle of Wormwood*, *Amber*, &c. dissolved in *Spirit of wine*.

R

I have

I have also poured upon the *Mass*, after it hath coagulated several *acid spirits*, before and after the *Serum* was separated from it.

I have also taken the separated *Serum*, and affused *Spirit of Vitriol* to some; to others *spirits of Harts-horn*, and other *spirituous waters*, and I have affused to those that had a mixture of the *spirit of Harts-horn* some *acid spirits*, and other liquors to see the *changes*.

I shall not now set down the several *Phanomena*, and observations I made, not having leisure to digest them all, nor being willing to dismember a discourse I intend about the nature of *blood* and *Plebotomy*, in which I shall not only treat of all these things, but adde many other observations, from the *burning of blood*, and the *Serum*, which any man may do, without feeling any thing by *sympathy*, notwithstanding the whimsies of *Helmont*, and that great *Virtuoso* Sir *Kenelm Digby*. I have done it forty times in *Men*, *Women*, and *Children*, to observe those varieties in *blood*, which never entred into the heads of our *Experimentators*. Though *Dr. Walter Needham*, my learned School-fellow, a Member of the Society, deny that *blood* will burn, *Carbonibus injectus sanguis flammam non facile concipit, sed potius torretur in grumum*. Yet if any one please but to take a piece of the coagulated *Mass* of *blood*, and lay it on a *Fire shovell*, and so place it in an hot fire, that the coals arch round about it, but touch it not: after he hath observed the great variety of its intumescence, and the crackling of divers salts, as it were decrepitating, it will take flame commonly when dry, and burn with a great variety of *Phanomena*: some will not flame at all, though brought to ignition: there will be also variety in the remaining *Cinis*, as to its saltness. In the like manner set the *Serum* to coagulate on the coals, and then burn it. I have also burned the *blood* and *Serum*, after it hath been mixed with *acid liquors*. By this trial will appear more then can be imagined as to the differences of the blood of *Animals*, and of young and old *Animals*, I will endeavour to finish that *Tractate*, wherein there will be observations about the colour of *blood*, and melancholique, and pituitous,

pituitous, and crimson parts; and a certain pellicle which generates by the Air on the top of most blood, if it stand 24 houres; which sometimes is as firme as those tunicles that encompass the Liver, or Kidneys. Observations upon that, and upon the turning of the coagulated Mass, and its becoming red again, though not so floridly. Trials upon that in vessels cover'd, that it is not from the air, in opposition to the Fracassati.

I will not mention any thing hereof now, but having imparted some observations to some, and knowing what plagiarists some men are, I thought fitting to publish *thus much*, that they might not pretend to the inventions, each whereof were enough to make one of them proud, and fill the *Transfusions*. Yet I will say this, That I never had put my self upon these trials, but out of envy and indignation against them, and the *Transfusion of blood*, about which they made such ado every where. I shall promise one thing, that Mr. Boyle is very much mistaken in, imagining that there is a great difference betwixt the effects of *Medicaments*, when mixed with the warm blood of an Animal out of the veins and in them, as will appear by the mixture of milk already specified, and that of the Salt of Tartar, which will follow out of the Letter of Berrichius.

Experiments upon the mixture of Liquors, with the warm blood of Animals, taken out by Phlebotomy.

1. By putting into the warm blood, as it came from Animals, a little *Aqua fortis*, or *Oyle of Vitriol*, or *spirit of Salt*, (these being the most usual and acid *menstruums*) Mr. Boyle observed, that the blood not only would presently lose its pure colour, and become of a dirty one, but in a trice also be coagulated; whereas some, if fine *urinous spirit*, such as the *spirit of Sal Armoniack*, were mingled with the warm blood, it would not only not curdle it, or imbase its colour, but make it look rather more florid then before, and both keep it fluid, and preserve it from putrefaction for a long time.

Transact.
numb. 29. p.
552.

*Ths. Bartho-
lin. ep. Cen-
tur. 3 ep. 97.
Pag. 421, 4:2*

2. The Learned and Inquisitive Man *Olaus Borrichius*, having cut up a dog alive, made these observations. He took five glasses, and placed them in order, putting into the one spirit of vinegar, into another oyl of Tartar per deliquium, into a third a Solution of Allom, into a fourth spirit of Salt Armoniac, into a fifth spirit of wine; into each of the Glasses, he suffered the blood of the Crural Artery to run. After some time he come to look upon his Glasses, but the next day the observation was most perspicuous. That Glass

which had the spirit of vinegar in it, it was become black like to the blood of Melancholique persons, with a thick and copious black sediment, and that liquor which was on the top, was blackish.

Where the Oyl of Tartar was, the colour was pretty florid, but the liquor more turbid, no sediment at all, only some filements, like little fibres floated in it conspicuously, here and there.

Where the Solution of Allom was, there all seemed like a subcineritious or dirty coloured putrilage, there being no reliques of the crimson colour of blood to be seen.

Where the spirit of wine was, there the liquor was more turbid then that which had the Oyl of Tartar in it.

Where the spirit of salt Armoniac was, that was of the most beautiful colour of all, being very florid, of a thin consistence, with a diaphanous sediment like to the gelly of currants.

This observation he also tells *Bartholinus*, that he had in like manner made the preceding Summer.

Out of all which it most evidently appears how nice a thing the blood is, and how small mixtures alter the colour and texture of it: and what consequences may follow upon such alteration of its consistence, and particular texture, no man knows; but that they may be very bad (even where innocent, and wholesom Medicaments are affused) is evident out of what I have set down.

*Inspeximus post intervallum & plenius
pollulisse omnia: Observavimus sangui-
nem, cui affusus erat spiritus feceri, reddi-
tum nigricantem instar sanguinis Melan-
cholicorum, sedimento crasso, copioso,
atro, supernaraptem liquorem, pene etiam
atrum. Cui affusum oleum salis tartari,
redditum coloris sic facis floridi, sed turbidi-
orem liquorem, sedimentum nullum,
ramenta tantum fibrillarum instar hinc
inde conspicua. Cui affusa solutio alumi-
nis, redditum instar putridæ & subcineritiz
putrilaginis, omni sanguinis colore pro-
tus abolito. Cui affusus spiritus vini, red-
ditum turbidiorem, quam cui oleum salis
tartari. Cui spiritus salis Armoniaci, red-
ditum omnium elegantissimum, colore
floridum, tenebrem substantia, infundo se-
dimentum diaphanum instar Galatinæ ri-
lium.*

It is also as manifest, that there are in the bodies of men and women *solutions* or *liquors* imbued with *sundry salts*, as *aluminous*, *acid*, and *vitriolate*, &c. which when they shall mix with the *injected blood*, what the *issue* may be, I leave the *Prudent* to conjecture. Certain it is, that for these *considerations* specified (reserving my own Experiments to myself) none but inconsiderate *Quacksalvers* would put a *Patient* upon the trial of *injecting* of *Medicaments*, or *transfusing* of *blood*. It is a course *Nature* (whose *Servants* and *Imitators Physicians* hitherto were) never prompted us unto: Having taken so many courses whereby *blood* might at any time of need issue out of the *veins* and *arteries* in *sundry parts* of the body: But especially provided that nothing might *immediately* come into the *veins*. Whatever comes into the *veins* by the *Stomach*, suffers a great alteration first, and whatsoever is *noxious*, either separates from it there and in the *guts*, or is *mortified*, or *mitigated* so as to be *innocent*, and agreeable to the nature of the *veins*. Which particular nature of the *sanguiferous vessels*, is that which in the *dead* keeps its own *blood fluid*, and in the *living* contributes so much to the *motion* of it, that if you make a *stop* and *intercept* the impulse of the *subsequent blood*, yet will the other *continue its course*. But what will the effect be of *Heterogeneous blood*? For undoubtedly the nature of the *veins* is agreeable to the *blood*, and communicates its *impurities* and *virtue*, as the *cask* doth to the *wine*. But further, since the *blood* is to pass through the *porosities* of the *Liver* and *Lungs*, and *capillary veins* and *arteries*, how will they agree with the *new blood*. (it being evident upon mixture of *Liquors*, and upon *burning*, that there is a difference in the *fibrosity* of the *bloods*, and consistence of the several *Serums*) or how will that *circulate* which results from the mixture, I know not, but certain it is, that the *ill consequence* is almost, if not *absolutely past remedy*.

In fine, what is it that is aimed at in this *Transfusion*? is it the *rectifying* the *mass* of *blood* (suppose *seventeen pound* in a body) with the affusion of a *few ounces*, or a *pound* of *Lamb's blood*?

They

Vide ep. Walli de motu sangu.

They may as soon rectifie as much *vinegar*, or decayed *wine*, with the like proportion of *good wine*? would they amend the *impurities of the vessels*? there is the same difficulty as before. That which they *transfuse* is not a *Chymical spirit*, but an *impure*, and *heterogeneous* mixture, fitted by different *digestions* and *ferments* to a *different nourishment* of another *Animal*, with *different excrements* resulting from it. It is in the *Stomach* and *first digestion* where food is so concocted by the *Humane heat*, or *Acidity*, as to turn to a *chyle* adequate to the *nourishment of man*, and generating such blood, and such excrements, as are the result of such a concoction as is agreeable to the nature of man. And so it is in all creatures: Thus we see, that in *different Animals* different *Excrements* are generated. nor is it to be doubted but that the *concoctive principle* differs as much in a *dog*, or *cat*, as do those *excrements* which differ much from those of *men*, though both eat the same meat. *Sicut acidus spiritus quilibet animam inseparabiliter in ventre suo portat, atque in illud corpus, cui infunditur, dominium suscipit, illudque confectum juxta sui naturam format: hinc spiritus salis in Alkali Tartari fusus statim sibi format corpus salinum propria natura consentaneum, & fit sal: & aceti spiritus, vel acetum distillatum in eodem Alkali tartari sibi format corpus adequatum sua propria natura, & fit tartarus vini, & sic de vitriolo, & reliquis acidis: Ita quoque acidum Stomachi humani, cum apprehendit panem, vel quicquam alibile, in quod dominari possit, illud convertit & commutat in chylum, & exinde in carnem humanam: & eundem panem Acidum Stomachi canini convertit & transmutat in carnem caninam: uti & de reliquis viventibus quotidie docemur, eo quod natura in omnibus iisdem instrumentis operatur.* If the Case be such, and that the blood transfused hath received those *impregnations of vitality* which are agreeable to the nature of the *Animal* whence it is transfused, and is qualified to generate such *nourishment*, and such *excrements* as are the consequences of those *digestive characters* (if I may so call them) and *impressions*; How can we imagine that such blood being immediately transfused into

Otto Tache-
nius Hippocr.
med. clavis
c. 9 p. 201.

our veins, without those previous alimental figillations and digestions, produce those effects which are to be expected in humane bodies, and are (though irrationally) in this case wished for.

But perhaps they think to achieve their design, by introducing a new texture in the vitiated blood, and vessels, or fermentation, whereupon should ensue the amendment.

I perceive indeed by their stories a new fermentation, that the dogs piss blood (no defrable or trivial accident!) But what a little time is there for the blood to pass unto the heart, and mix with those other Liquors, and ascending blood, and so to pass into the Heart and Lungs? How do they know that the blood they transfuse is good? Upon burning they shall find a difference in blood of beasts; and a different taste and coagulation in the Serum. Besides, that the blood of young Animals is generally less balsamical and inflammable, of another texture and colour, the Serum very saline; and in a word, exceeding different from what is in men and women of years. And in the blood of men and women, there are often defects not to be perceived but by coagulating and burning of the Serum and blood. I have taken the Serum of a Maid seemingly healthful, only pained at Stomach, and abounding in blood, it coagulated and looked like tallow, and would not burn at all, and smelt noisomely after coagulation, not before. I have several strange instances of this kind. If there be such indiscernable causes of distempers, and mixtures in blood of persons that are not well, if they neither know what they aim at in transfusing in, nor what they transfuse, Let Mr. Glanvill talk of great Advantages to be expected, and let them try it for me. Sure I am that the Transactions report an Untruth, in saying that Coga was ever the better for it: I am told his Arm was strangely ill after it, and difficultly cured: and if all the great likelihood of Advantages from Transfusion that are in their present Prospect, arise from no other grounds, they are very improbable. The Parliament of Paris have forbid it to be prosecuted but by the allowance of the Parisian Faculty of Physicians. A

Swedish

I had an intention to have set down at large all the Stories relating to the Transfusion of blood, with remarks upon them: but I was so much pressed to conclude, and had so little leisure to dispatch it in that manner at that time, that the Reader must be content with this brief, but I think substantial reply to all that hath yet been said.

See the Stories in the Philosophical Transactions.

I remember they say that it is not expressed, how the *Transfusion* was practised upon the Baron *Bond*, nor after how long time it was repeated when he died. But this is no excuse for them; for they have fixed no *rules* or *circumstances* whereby to regulate the operation; those are to be learned by frequent *Experiments*, and it may be, the death of more *Patients*. Next, it is not to be doubted, but that *He* that did it might act as cautiously as they, for his own credit, and the credit of the trial, and the quality of the Person. It concerns them to procure an *Authentic* Narration of the thing, and what appeared upon his being embowelled.

Swedish Baron died upon it: and to argue from the cures of *Madmen*, or from what they suffer without hurt, is not for a *Physician*, but for one that deserves to be sent to *Bedlam*: for mad people endures a thousand ills, and strong *Physick*, such as others cannot endure: and if they find any amendment sometimes by uncouth means, it is by accident, as it makes them ill, which sometimes prove their recovery.

As for dogs, they cannot declare what they suffer: but I am in haste, and refer my Reader to the perusal of the *Histories* in the *Transactions*: in which what I last objected, is all confessed: and if after all I have said, he find encouragement to try a remedy, that hath sometimes proved not *unfortunate*, (but is always *rash*), let him do it for me.

I am satisfied, That the operation carries more of terror (and many swoon upon bleeding) than a *poison*, or *Galenical Physick*; and that the greatest part of our distempers do not arise from the scarcity, or malignant tempers, and corruption of our blood, is as manifest as can be; more arise from the depraved motion, and redundancy of the blood, and serosities in and about the brain, and the laxity and strictness of the habit and pores of the body; and in these cases *Transfusion* is no remedy; much less in malignant diseases, in which to let blood is often mortal, commonly dangerous; and it always must be antecedent to *Transfusion*, excepting only the scarcity of blood; in which case what strength is there to assimilate, or ferment with the new blood.

As to the *Transfusion* of blood in *Pleurisies*, the attempt is very ridiculous, considering what an *Ebullition* and *Inflammation* of the blood there is then in the *Lungs*, whither the transfused blood immediately flows: what extravasated serosities do afflict those parts? how unfit are they for any reasonable fermentation? And in the *Small Pox*, how few are they

they in England which allow of *Phlebotomy* in that disease at all? and how irrational must that *Transfusion* seem, which disturbs and diverts nature in her present work? what hazard must the *Patient* run amidst a *Fever*, and that violent commotion of humors which afflicts his head, back, heart and lungs at that time, should he besides all other accidents fall into pissing of blood, a symptom so dangerous in that disease, and so usual a consequent of this Operation.

Having dispatched these papers thus far: the length of time since they were sent to London to be transcribed, perused, and several insertions made, according as my memory, amidst a constant employment, suggested any thing new unto me, and the delay of the *Printing* till *Michaelmas-Term*, gives me an opportunity to relate some Observations I made at Bath, during my stay there this Summer: As famous as the Bathes are, and of as general an use as they are (there being no better Remedy in the world for the Scurvey then the *Croft-Bath* regularly pursued, and as it might be, I cannot say is commonly practised) yet have not our *Experimental Philosophers* made any Inquiries into its nature and qualities: not a man of them ever so much as tried the mixing of several liquors and spirits with the water: as I did, and found no change upon the mixture of *Acid spirits*: but the urinous and volatile spirits of *Sal Armoniack* (drawn the *Leiden-way*) and *Harts-horn* did change the water of the Pump in the *Croft-Bath* (which ariseth from the hot Bath) into a lacteous colour and opacity, insomuch that it represented an *Almond-milk*, and after a time there precipitated to the bottom an inspid *Magistery* resembling *Burnt Harts-horn* finely powdered: the precipitated powder was more copious in the affusion of the spirit of *Sal Armoniack*, then that of spirit of *Harts-horn*: and the former in that mixture lost its urinous smell, (and made no unpleasant, but an unctuous, soft, emulsion-like drink) which the other retained.

Not a man of them ever tried whether the several Bath-water would coagulate milk: which I tried first, and found that the *Kings-Bath-water* makes *Posset* with a soft curd, and whitish posset-drink, which will not become clear: the *Croft-*

Bath makes an *hard curd*, a *clean* but *whitish-possit-drink*: the *Pump-water* of the *Cross-Bath* (which ariseth from the neighbouring *hot Bath*) yields an *hard curd*, a *clear* and *very green possit-drink*; which being drunk by a woman that gave suck bred a great deal of milk (more then *fennel possit-drink*) and made her break *abundance of winds*, which those usually do that drink the *Bath-waters*. And I believe this way of giving the *Bath-waters* might be no *small improvement* of *Physick*, were those courses taken *there*, and that *method* which those that understand the *ancient* and *modern Bathes*, and waters that are drunk, might easily pitch upon: but this is above the reading of our *Comical Wits*.

I could find no grounds to believe there was any *sulphur*, or *bitumen* in the *Baths*: but rather

Mr. Ch. Hotham, when I shewed him some of the extracted *Salt*, did conceive it to be a mixture of *common Salt*, and *vitriol of Iron*.

When I was there, a *Spring* of the *Cross-Bath* being lost, they dig'd for it; I tatted the *Earth*, but could finde nothing *nitreous* in it: opening the *gutter* by which that *Bath* empties it self, we found the passage crusted very thick, with a white *lapideous concretion*, rough and unequal in the surface, with several *crystals* fixed in it, resembling those of *cream of Tartar*: to taste, it was *insipid*, and of substance like to what precipitates, with *arinous spirits* in the water: but after it had lien on the tongue a while, some pieces discover'd a taste exactly like *cream of Tartar*, others an *adhesion* somewhat *vitrioline*. I thought some away, and intend to examine it further.

Some odd *Alkali* mixed with the *vitriol of Iron*: I extracted the *Salts* by *evaporation* of two gallons of the *Cross-Bath-water*; and having reduced them to three quarts I set it to *shoot*; but there was no appearance of *salt-peter* at all: then I evaporated it to *three-pints*, but still neither *salt-peter*, or any other *salt* appeared: then I evaporated it *quite away*; and then I had about two ounces of a *dark coloured salt*, which at first resembled *cream of Tartar* somewhat in taste; but having lien longer on the tongue, it resembled very much the *Vitriolum Martis*, with some more

Alcalifate taste: I performed the *Operation* both in *Iron* and *Glass vessels* with little difference of the *taste*, or quantity of *salt*: some of the said *salt* dissolving into a *moisture* in the *air* did eat off the *writing* upon such papers as it fell, and turned the paper *yellow* all over, and rotted it. I made a *Lixivium* with the *Cross-Bath water*, and evaporated *that*, thinking that if there were any *unctuous matter* in the water, it might hinder the discovery of the *Nitre* in its *shoot-ing*; but neither could I finde any thing of *Nitre* this way: but

but still there was a taste of the *Vitriolum Martis* in the salt: and one Mr. Barrow a Practitioner there assured me, that he had known the Bath-water drunk, and to have tinged the *Esquimaux* black, but I cannot avow the truth of that.

I inquired about the earth of what Dr. Mearn had writ about the Stone he took up, upon *Lands-down*, which being infused in water produced a resembling heat and taste to what is in the Bath: But Dr. Meplet, an inquisitive and learned Physician there, who was with Dr. Mearn then, and had some of the mineral stone, assured me it was a *lime stone*: so did Mr. Chapman an observing Apothecary there, who likewise saw the Stone, and tasted the infusion. In fine, where Dr. Mearn took up that Stone, any man may take up a thousand, they not being cast out of the Earth, but dropped out of the *lime carts* which pass that way into Bath, the *Kills* being thereabouts.

The stones in the bottom of the *Cress-Bath*, many are of reddish rusty colour, others green: but concerning the Bath, I may next Summer, during my stay there, in the midst of June and July (if God give me life and health) make a further Narrative: I only mention this to prevent the *Virtuosi* from usurping upon my discoveries and intendments. Yet to do them some justice, I was told that in some of their *Translations*, they have this observation about Bath, that if any person that is drunk go in there, the Bath will make him sober: If any that is in the Bath drink freely there, it will cause him to be presently drunk, with less drink by far than if he were out of it. This report is worthy of our Philosophers, and advanceth their intelligence above the credit that *Aristotle* and his Hunters deserve. The first part is defective, for it should have been added, that the drunk person must sit still, and sweat soundly: if he stir up and down or swim, he shall be more sick than if he had never come in. The second part is notoriously false, and all the Bath-Guides and others that have tried it, avow, that 'tis usual for the Townsmen to sit some hours and drink in the Parlour of the *Queen-Bath*, and never be drunk: and they say, a man that sweats there shall bear much more drink, than if he were out of the Bath: which I thought rational and agreeable to what I had observ'd in the Indies, where men sweat and have more drink than in England, and stronger.

But I come now to that Case, for which I adde this *Discourse*, and that is, Observations upon the mixture of the *Bath-water* and other *Liquors* with *blood*, and the *Phænomena* thereupon, which, though I might reserve for that other discourse of mine about *Pblebotomy*, yet I will oblige my *Reader* with some of those *Curiosities* here, especially since it will give him occasion to reflect how facile it is to multiply such *Experiments*, and how negligent they are who pretend to be the grand *Observers* of this *Age*.

When I went to make use of the *Bath*, amongst other *Preparatives* thereto (which are better taken upon the *place*, then at a *distance*) I caused my self to be let *blood*, and being willing to improve that occasion as well for my *instruction*, as *health*, I caused several *Venice-Glasses* to be filled with several *liquors*, each liquor amounting to some three ounces, and into each glass I suffered to run as much as half an ounce of blood, or little more; taking no other measure, then that the whole liquor seemed of a deep blood red. The *Phænomena* thereupon were these ensuing. being observed presently after I had bound up my arm, and was in condition to write.

1. That *Glass* which contained the spirit of *Sel Armoniack* (drawn the *Leiden-way*) kept of an equal consistence from top to bottom, being of a deep red, and not transparent, like *Tent-wine*.

2. Into two several *Glasses* I had dissolved the *Salts* of *Ash* and *Wormwood*, half a dram in three ounces of water; the solutions of these two *Salts* shewed no difference at all; the top, after some space, was of a florid red, (such as is visible in watrish blood) for about a quarter of an inch: the bottom was of a more dark red, and resembled *Tent-wine*.

3. A fourth *Glass* held *Oleum Tartari per deliquium*: the blood and that liquor did not first mix, but were at two distinct liquors, notwithstanding that the blood had streamed into the *Glass*: After a while the blood and oyle mixed together, and it all became of a deep-red from top to bottom; the surface only was transparent, and of a brighter red, as that of the other *Alcalisate Liquors*, but not so far downwards: the rest was as *Tent-wine*.

4. I dissolved half a dram of *Alum* in three ounces of water, and upon bleeding thereupon, all the *crimson* of the blood was immediately destroyed, and it became almost as black as ink: after a little space towards the surface it cleared up: there were certain bubbles on the top that continued the redness.

5. Another Glass held a quantity of the *Kings-Bath water*, the blood that did stream into it, appeared of a dark red, but transparent, as deep *Bordeaux* wine shews: a little below the surface it was deeply red, not transparent, but like *Tent wine*.

6. The *Cross-Bath* altered little from the *Kings-Bath*, saving that the transparency of the surface extended it self downwards to a greater profundity then the other.

7. A Solution of half a dram of *Sal prunella*, yielded a blood on the surface like to that of *Salt* of *Wormwood*, but not to so deep a descent: otherwise it was of the colour and consistence of *Tent wine*.

After they had stood in the window about five houres, I returned and observed these *Phanomena*.

1. That with the *spirit* of *Sal Armoniack* continued like *Tent wine*, only the uppermost part of it to the thickness of a barley-corn, was diaphanous as deep *Bordeaux*-wine.

2. That with the *Sal prunella* coagulated into a *Mass*, shrunk from the sides of the *Glass*, and sunk to the bottom, leaving them super-natant water of a pale citrine colour; the *Mass* it self being of a florid red on the surface, and of a deep red, not blackish, to the bottom, that I could perceive.

3. That with the *Cross-Bath water* changed not, but seemed thick as *Tent wine*, the upper part being diaphanous, and like deep *Bordeaux*-wine?

4. That with the *Kings-Bath water* changed not; only the diaphanous surface extended not it self downwards so far as the other *Bath water* did.

5. The *Solution* of *Alum* continued all fluid and black; no coagulated mass therein: but the bubbles had lost their

their crimson-colour, and were become cineritious.

6. That with the Salt of Wormwood resembled deep Bourdeaux wine, but was less diaphanous a little below the surface: The surface extended downwards to the length of a barley-corn with a perfect transparency.

7. That wherein was the *Sal fraxini* was diaphanous to the bottom; no innatant filaments, or coagulated mass in it: But the surface to the length of a barley-corn was like decayed Claret made with a mixture of white and red wine: the residue was deeper like that of Bourdeaux.

8. That with the *oleum Tartari per deliquium* was diaphanous to the length of a barley-corn, and of the colour of Bourdeaux wine: the lower part un-coagulated, and like Tent wine.

9. It is to be noted, that the reflexion of the Glasses in all the Liquors, they being held up to the light, (except the spirit of *Sal Armoniack*) did create a corona of several colours, mixt with green, blew, and so as not one resembled the other. That with the *oleum Tartari per deliquium* resembled the blew in Bourdeaux wine, with an eye of green.

I had forgot to relate how I kept some of the blood in a separate Pottinger; and it seemed excellently well coloured; when it coagulated, the top was of a due red, the bottom blackish red; the serum of a due transparency and proportion, and not tinged to citrine colour: and coagulated all as the white of an egge over a gentle fire.

I poured also upon the blood in two other Pottingers; upon the one spirit of *Harts-horn*; on the other spirit of *Sal Armoniack*, but not much: perhaps a dram or more: that with the spirit of *Harts-horn* at first seemed more florid, then that with the spirit of *Sal Armoniack*: both coagulated into Masses after a while, and were then both of one colour on the surface: but that with the spirit of *Sal Armoniack* coagulated its Mass so as to break from the sides: that with the spirit of *Harts-horn* did not break from the sides; whether the blood of one, and the other might differ, I know not; but both immediately followed one the other. That blood which had nothing mixed with it, after coagulation, differed

ferred not from the other two, though they were covered over with the *spirits*, as soon as they were taken, and that exposed only to the *Air*.

After a while upon the *surface* of that with the *Kings-Bath-water*, there was a kind of fatty *cremum* which covered the whole *surface*; and so on that with the *Queens-Bath-water*: the others had none at all.

On *Munday* after dinner, the next day after I had bled, I came to observe again; and found,

1. That with the *Sal fraxini* to be more and more diaphanous, resembling *Bordeaux* wine: that with the *Sal absynthii* less diaphanous, but red still.

2. I observed the *Solution of Allom*, and howeever it looked black, yet being held in a clear light, one might discover in it visible appearances of a deep red. I poured on it some spirit of *Sal Armoniack*, to see if it would restore the colour: but in stead of that the *liquor* coagulated presently into little *massula* or flakes, resembling raw flesh when the blood is washed out.

3. There was no alteration in that with the *spirit of Sal Armoniack*.

4. That with the *Queens-Bath-water* continued more diaphanously red towards the top: but that with the *Kings-Bath-water*, did not lose its redness, though it were not diaphanous near the surface.

5. Of the two *Pottingers* in which were the *spirits of Harts-horn*, and *Sal Armoniack*, though both were coagulated, yet that with the *spirit of Sal Armoniack* was the most florid.

6. That with the *Oleum Tartari per deliquium* continued red, but lost its diaphaneity at the top almost quite.

7. That with the *Sal prunella* after the coagulated *Mass* had subsided, had on the top of it in the middle of the *Glass*, to the breadth of six-pence, a concrete gelly, exactly resembling that of the clearest *Harts-horn*, not boyled up to its greatest height; from

From hence protended certain filaments, with which it was fastned to the *mass of blood*, which was *buoyed up* thereby, so that it touched not the bottom; the *jelly* was *insipid* and stuck to my finger, when I touched it: whether that little which did so adhere took off from the *equipollency* of the two bodies; or whether I broke casually some of the protended filaments, or from what other cause I know not; but after a while the *Mass* sunk quite to the bottom, and drew the *gelatine* below the surface of the water.

8. Upon the pouring out of the blood, that with the *Queens-Bath water* happened to seem of a pure *Claret*, like *Bordeaux wine*, no *setting*, or *floating filaments*, but *something red*; which resembled exactly the flying Lee in bottled *Claret*.

9. That of the *Kings-Bath water* appeared as the former, only at the latter end, as it was poured out, there was a certain *gelutine* mixed with it, and sticking to the sides, that for colour and consistence exactly resembled the *jelly* of red currants.

10. That with the *spirit of Sal Armoniack* upon effusion, appeared like deep *Bordeaux wine*, and so from top to bottom without any alteration.

11. Upon the effusion of that with the *salt of Wormwood*, it appeared also like to *Bordeaux wine*; but towards the bottom there was *Gelatine* red, like that of *red currants*, more tenacious and in greater quantity then was in that mixture with the *Kings-Bath water*.

12. That with the *sal fraxini* poured out like common or less deep *Claret*: at the bottom there was no *Gelatine*, but it ran a little thicker like to *Tent wine*.

13. That with the *Oleum Tartari per deliquium*, upon its first effusion ran like *Claret* a little decayed: but the most of it dropped, as if it were a weak *Gelatine*, and so continued to the last, being almost of as deep colour as a ripe *Mulberry*; I poured upon some of the said *jelly* almost as much of the *spirit of Sal Armoniack*, and it immediately dissolved all the *jelly*, and made it fluid, yet so as that the *bloody crassament* appeared *unequally mixed*, some parts being more deep and opacous then others.

14. I took the Pottinger in which was the blood with the spirit of *Harts-horn* affused to it, having separated the mass from the sides of it, I poured out the Serum, which was as black as common Ink: the surface was red, but not so florid as that with the affused spirit of *Sal Armoniack*: most of the melancholy blood seemed dissolved into that black Serum, the super-incumbent mass being thin.

15. That blood on which the spirit of *Sal Armoniack* was poured in the Pottinger, appeared from top to bottom red, only in the bottom there were some little spots of a blackish and darker red then the other parts: on the surface there was a Gelatinous pellicle generated: the Serum was of a citrine colour: the consistence of the coagulated mass of blood here was more tenacious and fibrous then in that other Pottinger with the affused spirit of *Harts-horn*: There was no pellicle discoverable upon that with the spirit of *Harts-horn*; upon that with the spirit of *Sal Armoniack* so tough an one, that it would bear up a little way in your hand the whole mass of blood adhering to it.

16. The blood which was kept in a Pottinger without any mixture, being placed in an arched fire on a fire-shovel burned with a bright and continued flame, as if it had been Turpentine, but crackled like a green bay leaf cast into the fire: and so it did being cast immediately into the fire, but the crackling was less durable, by reason of the vivid fire into which it was cast. It is to be noted that this pottinger having been removed into the *Sonne*, all the Serum was exhaled or incorporated into the mass, which was grown to the bottom of the Pottinger, and dried there, so that I scraped it off: whether that might add to the Phenomena, I know not.

17. The blood in that Pottinger where the spirit of *Harts-horn* was affused, being taken out and placed in an arched fire, rose up with an equal intumescence, as a cake doth in an Oven; it crackled much less then the unmixed mass of blood: It burned slowly, with a continual but not vivid flame, and in such a manner as if the mass had never taken fire, but only the smoke issuing from it; for one might easily see an interstice betwixt the mass and hovering flame all the

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while

while, till it came to a perfect Ignition.

18. The mass which had *Spirit of Sal Armoniack* affused unto it, being placed in an arched fire, did rise with an *equal intumescence*, but greater then that with the *Spirit of Harts-horn*: it *crackled* less then that with *Spirit of Harts-horn*: the flame at first resembled that of the other; afterwards instead of *hovering* about, it seemed to issue immediately from the blood, and not to appear like a smoke that took fire within the arch: the flame then was vivid, and continued.

19. The fire being an exceeding quick fire, I poured some of the serous blood that was in the Pottinger, impregnated with the affusion of the *Spirit of Sal Armoniack*, and as it dried it took fire presently, the flame resembled that of the former mass, only it wasted faster than that, being cast upon so quick a fire: The black Serum of the coagulated mass with affused *Spirit of Harts-horn*, though cast into the same fire, would scarce burn at all.

20. I took some of the mass that was impregnated with the *Sal prunella*, and placed it in an arched fire (the Serum or Solution poured off from it was insipid) it rose with an *unequal intumescence* coping, like a loaf, in the midst: I brought it to a perfect ignition and coals, yet did it not crackle at all, neither burn till the last, and then but a little, and with an interrupted flame which seized now on this, now on that part: nay, there was but very little sign of any *Sal prunella* in it to sputter as it burned.

21. I told you how I poured some *Spirit of Sal Armoniack*, upon the mixture of blood and a Solution of *Alom*, and of the odd coagulation that hapned thereupon into white massula which seemed like flesh when the blood is wasted out of it: I took of those incoherent flakes or massula, and putting them to burn in an arched fire upon the fire shovell, it run all off, upon a great ebullition, into the fire: I took the red hot fire-shovell, and placed some more upon it, which seemed to burn as *Alom* doth in the like case, and so stayed on it: but being put into the arched fire, and brought to ignition, it would neither flame, nor crackle, nor left any visible quantity

tity of coals or ashes behind it, as if it had almost all evaporated.

22. These were the *Phænomena* which I had opportunity to take notice of at that time: but I also left a *Solution* of the *Alkali of Nitre* of about three ounces with the Apothecary, if any else came to bleed there in my absence: upon bleeding, an healthy young man that was somewhat indisposed, some was suffered to *stream* into that *Solution*: at first it was of a *florid red*, but paler than blood usually is, resembling a *bastard-scarlet*: after some days standing I found it of a *deeper red* from top to bottom: one half of it was transparent like to the *duller* and more decayed sort of *Claret*: the other half seemed like *Test-wine*, not diaphanous: on the surface there was a *cremor* which extended it self almost all over it: Upon pouring it out, it appeared all to be of a *blood-red*, only that which ran last was of a *deeper dye*: at the bottom there was a kinde of *Gelatine* like to that of *red Currants*, which rendred the one half of it *opacous*: it was no way dis-coloured, nor *unequally mixt*: the *spirit of Sal Armoniack* being poured on it, did render it *fluid* presently and *transparent*.

Having occasion after some weeks stay at the *Bath*, to ride in *extream hot weather* above 200 miles in a few days, and being tired with watching and the journey, and being wet very much with a great shower of rain at my return, I went immediately into the *Cross-Bath* for half an hour, to prevent any inconveniences that might befall me upon such travel: but at my coming out of the *Bath* I felt so violent a defluxion into my *throat*, and the adjacent *Glandules*, that I apprehended some danger of a *Squinency*, which yet I avoided by *bleeding*, *purgings*, and other means together, with the use of the *same Bath* after all: when I was to bleed, I was willing to try some further *Experiments* in *Liquors*; different from the *former*, and the *Observations* I made were these.

1. I caused *two veins* to be opened in the *left arm* at once, and received one Pottinger out of the *Mediana*, and the other out of the *Cephalica*: my intent in that was to observe (as I had done once before in my self) whether the blood of *two veins* in the same arm would yield *different blood*: if so, then I thought that it might not be indifferent in what *vein* a man bleeds, though they all arise from one *trunk* of the *vena cava*; and that we might justly have regard to those cautions of our observing *Ancestors*, not to bleed those veins *promiscuously*, but some in one case, and some in another. I was confirmed in those sentiments by the *Phænomena* I met with a second time in the *trial*, as other observations have satisfied me about the doctrine of *revulsion*, and its truth. Having taken one Pottinger out of the *Mediana*, and another out of the *Cephalica*, I stopped the *Mediane*, and continued to bleed into the *liquors* out of the *Cephalick*. In the first, issuing out of the *two bloods*, I could finde no difference in the colour or consistence; but after standing three or four houres, that of the *Mediane* had much less of *Serum* in it: the *Serum* thereof seemed *Limpid* in the Pottinger: but that of the *Cephalick* was *citrine coloured*: that of the *Mediane* somewhat of a *volatils saline* pungency upon the tongue, different from the taste, which the other *Serum* had, that being very salt: that of the *Mediane* had a *blewish Gelatine* gathered upon the top of the *condensed mass* of blood; the other had none, but was of a florid red on the top. After two days I came to look on them again, and upon turning the *coagulated mass* of blood in the pottinger, that of the *Mediana* had much more of *black* towards the bottom, then the other: and also a *thinner surface* of red then that of the *Cephalick*.

2. To carry on the Experiment of mixing several *liquors* with blood, I bled into some ounces of *Aqua mirabilis*, which grew deep coloured almost unto the top, which was transparent and of the colour of *Mauve wine* almost: after some houres the *Liquor* became of a *bright beautiful Claret-colour* almost unto the bottom, where there was an *opacous, dark-red settling*, with an *enarema* of *contexted filaments* pretended to

to the top. The *Wasps* flocked to *that glass* in great numbers, and drowned themselves in it, not meddling with any other of the subsequent *glasses*. After two days was little changed, only the beautiful *Claret* was somewhat *darkened*.

3. I bled upon some ounces of *Treacle-water*, which turned as *black as Ink* presently, but continued the blood perfectly *fluid*: The *red* was so destroyed, that the *Aluminous Solution* did not equal it; there not being upon *inclination* of the *glass* the least sign of any *incarnadine*; and so it continued for two days, no variation happening.

4. I bled upon some ounces of *Cinnamon-water*, which turned of a *pale red*; if I held up the *glass* to the light, it seemed almost to the top *opacously red as Test nine*; but, if viewed otherwise it seemed of a *paler red*, approaching to *bastard-scarlet*. After a while it seemed as if all the blood were coagulated into one *mass* from top to bottom, subsiding a little within the tinged *Cinnamon-water*. Upon *agitation* and stirring with a *knife*, it appeared that the *fibres of the blood* were so destroyed, that this *mass* was no *coherent* thing, but broken into little *massulae*, or parcels of a *pale red*, such as the *subsiding curds* are in *whay*. After two days I viewed it, and found the *Phænomenon* of the whole *Glass* to look *cherry-coloured*, but the *incoherent massulae* were of a *pale red*.

5. I bled into some ounces of *Aqua-Bezoartica*, that did coagulate with the *Blood*, so that it all fell in one *incoherent mass* towards the bottom: but whether there hapned to be a greater proportion of *Blood* in the *glass*, or for some *other cause*, the coagulated blood filled almost all the *water*, much beyond what we observed in the *Cinnamon water*: the consistence of the *one*, and the other *massulae* were like the *curds* in *whay*; these were of a *pale red* retaining to *whiteness*; and so it continued two days; the *small quantity* of *water* appearing in it giving no opportunity for further *Observations*.

6. I bled upon some ounces of *Nantes-Brandy*, it gave us a more *tenacious curd* than the former, of a *pale red*: but the *mass* and *liquor* was *opacous* towards the bottom, so as to
appear

appear like *Tent-wine*, in what light soever I placed it. After two days that of the *Brandy* which was *fluid*, (the curd not being answerable to the *Aqua Bezoartica*) was of a pretty florid red, the coagulated mass was of a brick colour.

7. I bled upon some ounces of *Anise seed water* drawn from the grounds of beer, it yielded a mixture of a deep blood red from top to bottom, somewhat transparent. The mass coagulated from top to bottom, the curd was of a deeper red then the others, and of such a tenaciousness as is to be found in the soft curd of *possets*. After two days it turned blackish, the coherent curd being of a little lighter red.

8. My indisposition, and other cares permitted me not to prosecute these Experiments as I did the other: but one curiosity more possessed me, to put two drams of spirit of *Harts-horn* into a pottinger, and to bleed thereupon, to see if it would alter the *Phaenomenon* from what it is, if the spirit of *Harts-horn* be poured on the blood: I did so, and I found at this time that it kept my blood from coagulating into such masses as otherwise it would, but the blood turned blackish-red, and in it there was observed a crimson gelatine, which run off the knife as jelly of red currants would, when beginning to cool. After two days it continued still fluid, but blackish. I have sundry times tried that way of putting spirit of *Harts-horn* into the pottinger first, and then caused them to bleed upon it with this success, that immediately it spoiles the red, giving it a more dirty colour, and casts up a mucous phlegme, (such as I never saw in any blood upon other Essays) just like what many spit and blow out of their noses in catarrhs: this covers all the pottinger, without any mixture of blood in it, and would be white, but that the subjacent blood gives it another muddy colour. The blood under it was always fluid, and unequally mixed with parts of a bright and blackish red. Whether my journey, or distemper prevented that appearance in my blood, I know not.

9. I had a Patient there which had unknowingly taken much of *Mercurius dulcis* in pills at London, to her

her great prejudice several ways: and though she had taken *golden-bullets*, and used other means to discharge her body of that *troublesome Inmate*, yet found little benefit: At the Bath I let her blood, and to try an *Experiment* I cast a *Guinny* into one of the *middle Pottingers* as she bled: I could observe no difference betwixt the blood preceding, and that therein: but in the *afternoon* I came and went to that pottinger which had the most *florid* and best coloured blood, and searching there found my *gold*, and that stained with white spots from the *Mercury* on the *lower side*. Whether the separation of the *Mercury*, or some other efficacy in the *Gold* (of whose power in such cases I can give good instances) caused that difference in the *bloods*, I cannot tell, having never tried it since.

Being not well at Warwick, by reason of a violent defluxion into the Glandules of the Throat, I caused my self to bleed
Octob. 20.

1. I took six drams of spirit of Harts-horn, not very well rectified, nor clear of colour, and put it into a crystal-glass; and bled thereupon about half an ounce of blood; it turned of a *dark red* presently, inclining much to *black*, though, as it stood, or as it was held on one side, you might perceive a lighter, but not *florid* red at the sides. It seemed fluid for two dayes; but as I poured it out it appeared to be very *Gelatinous*, and of colour like that which is become *sanious*, and degenerated into *blackiness* with keeping.

2. I bled upon the same liquor of Salt-peter, about half an ounce of blood, upon four ounces of liquor, at first the blood did turn on the surface to a *dassard-scarlet* (which is an effect every thing of Nitre mixt with blood to produceth) after-

afterwards the whole blood sunk to the bottom; the upper part being all of *one colour and consistence*, such as is observed in the *Serum* of the blood somerimes, when the *supernatancy* is whitish, and not transparent. Being poured from the blood, I found that coagulated into a *mass*, which was all of a very *natural red* all over, only spotted in many places underneath with *black spots*. The concretion was so brittle, that it would not hang together, nor endure any *light pressure*, but as it were melted, and seemed *gelatinous*.

3. I bled upon a *Solution of the Alkali of Nitre*; it appeared upon the first mixture like *bastard-scarlet*; then the blood sunk to the bottom, the top being transparent, yet of the colour of *High-countray white-wine*: the bottom seemed redder then that of the former; the *limpid liquor* being poured out, seemed all *gelatinous*, and had incorporated with it the *serous part* of the blood: the red at the bottom was *fluid* and not *tenacious*, but of the consistence that blood is of when it is *hot*, and newly received in a vessel out of the *veins*.

N.B. After I had poured out the blood and mixtures out of the several glasses, and that the glasses had stood a while, I observed that that of the *raw Liquor of Nitre*, which remained in the bottom, did turn of a most beautiful red, as ever I saw in any thing: but that with the *Spirit of Hartshorn*, or *Solution of Alkali*, &c. did not vary: after two days all the remains of blood in the several glasses turned *blackish* and *sanious*, only that with the *raw liquor* altered not.

4. I bled upon the *liquors of Salt-peter* which had passed the *ashes*, and on that which had never passed the *ashes*: both were of the same *blackish* and *sanious* colour (after the first *bastard-scarlet* was past) both had on the top a certain *cremor*, which being cast into the fire discovered it self to be *nitrous*: both of them, though they were of such a *dirty red* inclining to *black*, yet were they of *one consistence* from top to bottom all *fluid*, nothing *gelatinous*, nor any one part *black*, or redder then the other. Which is very much, considering the difference of the *two Liquors*.

5. I bled upon the *unctuous Mothers of Salt-peter*, which turned at first to a *bastard-scarlet*: the blood did never mix with

with the *Mothers*, nor otherwise ting *their* colour, then as it cast a shadow by its innaring on the surface of *them*. It *coagulated* on the top of the *Mothers*, being of colour all thorough exactly like to *Ocher*: the *concretion* was a quarter of an inch thick, a firm mass *to see* to, like so much *bees wax* cast into a cake: I took it up in one mass with my knife but trying its *tenaciousness*, I found it as brittle as most *short cakes* are. Upon the *surface*, there was an appearance of certain *fria*, which might be *saline*. All the blood did not *coagulate* so, but underneath there was a quantity which in the glass was of *equal dimensions* with the *other mass*, it was of the colour of *Oker*, and *fluid*, and would not mix with the *Mothers* at all: I took of the *mass*, and tried to burn it in an arched fire twice or thrice, it boyled and bubbled up upon the fire-shovel, like impure *Niter*, and so burned with a flashing, as if it had been most of it *Peter*, it never came to flame as *blood* doth *usually*; only one blaze as it were always *hovered* over it for a moment or two, not being continued to the body, otherwise then by a parcel of *smoke* issuing out them.

6. I took also two *pottingers* of blood, the *first* and the *last* of the *blood* I took away: there was no difference in the blood of one and the other; the *coagulated mass* well-coloured, of a good *consistence*, less of that *black or melancholick crassament* then is commonly found: the *Serum* well-coloured, of taste *brinish*: I placed it in an *arched fire*, it rose up with a *globous intumescence* (but crackled not so much as at *Batbe*; though very much, and like a *bay-leaf*) it burned with a continued, vivid, and lasting flame.

I suffered a *pottinger* of the same blood with which this last *Experiment* was made, to stand ten days or more, in which time it was quite dried up into a *hard fryable mass*, the top of which was almost as black as *luk*, the *bottom* having somewhat of a *dark red* in it. I cast a *piece* of it into a quick *coal-fire*; therein it crackled like unto a *bay-leaf*, but burned with a short and *weak flame*. I placed another part of it upon a fire-shovel in an *arched* and *quick fire*, where it crackled as much as the *other* did (and more then that part

of the *same blood* which was burned in the fore-going Experiment of blood newly congealed, and separated from the Serum, which was in this last case dried into the mass) and it did burn with a *vivid and continued flame* presently. Which accident I take notice of, to shew the different Phenomena upon the *diverse way of burning the blood*. I took a third portion of the said congealed and firm mass of blood, and put it to some cold water in a Glass, and it dissolved most of it therein, and tinged the water of as beautiful a red as any claret, though otherwise the mass were blackish, and had nothing of red but what was in the extimous crust of the bottom, which seemed of a most deep red inclining to black.

I suffered two or three spoonfuls of Hogs-blood to run into a large Venice-Glass, in which was halfe a pint of the Mothers of Peter; I suffered it to stand some days, and coming then to see it, I observed that the Mothers were become opacous almost to the bottom, on the top was a mass of coagulated blood exactly resembling the colour of Oker; it was so firm, that I took it with my knife in one entire piece, but I found the top and bottom of the mass (which was pretty thick) to be very soft, but not as it were fibrous; the middle was more firm: I put some of it upon a fire-shovell in an arched and quick fire, when it boyled up, and ran about, and by its sputtering discovered a mixture of Salt-peter: but it did not flame at all, though I brought it to ignition. Examining the remaining Mothers, I found a sanguine mixture to float in, and stain the liquor of an Oker-colour, and some of it was aggregated into little masses or lumps, whose particles did not cohere by any tenacious fibres (indeed I have not been able to observe any tenaciously-fibrous coagulations in the blood of Hogs hitherto) but upon the least touch of my warm hand, they dissolved or yielded unto the least pressure. Out of all which I intend to deduce, that some common Experiments may shew that, which no Chymical Fires give any light unto. That there is a great diversity betwixt the blood of other Animals, and that of Men: because that upon the same Liquors they disclose different Phenomena; and consequently that the Transfusion is a rash and unsafe attempt.

I shall conclude with this intimation, that neither is the blood of several Animals, nor the blood of the same kinde of Animals the same; but in taste and colour of the Serum there will be often a sensible difference, and it is rational to think the like of the blood it self: nor do they burn or congregate alike, or with the like Phenomena: nor is the blood of the same Men always the same, though he continue within the latitude of Health; and in diseases Epidemical let two bleed, and there shall often be no affinity in the colour of their blood, or in the Serum, the one being white and turbid, the other Limpid, the Serum of the third citrine-coloured. And if so, what regulations shall we have for this operation: shall a transfuse he knows not what, to correct he knows not what, God knows how? This may become indeed that sort of men, being the worst and most irrational Empiries the Sun ever shined upon, as I demonstrate more fully in my Letter to a Physician, in a Parallel betwixt them and the ancient Empirics.

Let them from these Observations draw their sophistical Conclusions for and against Spirit of Harts-horn; for, and against Spirit of Sal Armoniack; against Allom, and Treacle-water, and such like; till all the world come to admire them as much as I: And that there be a new History penned to render them as contemptible as this magister, by a Rhetorick that hath more of the nature of the Microscope, then of Truth.

The other day coming into my Apothecaries Shop, and finding one (not otherwise very ill) going to bleed, I sent for a bottle of that Lixivium of Salt-peter which had passed the ashes, and into the first pottinger which he bled, which seemed to have little of crimson in it, but a Serum of a dark-blue colour; I poured a little of it, and it turned black, though it continued fluid. Into the third pottinger which seemed better blood, with a red colour, I poured some of the same liquor, and it improved the colour, and kept it from coagulation awhile; what hapned afterwards I had not leisure to observe.

Miscellaneous Additions by way of Postscript.

Whatever may seem to be said from hence in favour of the spirit of Harts-horn, is not so valid as may be imagined: for I have mixed a little of the Solution of the Alkali of Nitre (which turned Syrup of Violets green, and

and rendred it less fluid upon the blood of a man, which was blackish, waterish, and ill-coloured, after it began somewhat to coagulate, and I brought it to a new fluidity, and as vivid a red as ever I saw: and so it continued for 24 hours; at my return after two days, I found the blood in the Pottinger, (by reason of the Sun on the window) all coagulated, and become friable; but even that it had visible signs of a remaining redness, which the other blood that had nothing effused retained not. Oyl of vitriol affused to the Serum of blood, tinged with the crimson part, doth improve the red for an instant or two, but then it turns black and coagulates into a soft mass, that admits the least impression; the fibres being destroyed; but yet it burns rather better, brighter, and quicker then otherwise; being poured on the surface of coagulated blood, on the top whereof was rough pellicle generated; it did not eat the pellicle, but in one night reduced the Mass, almost to the bottom, into a consistence like to Bees wax, which burns well.

In January last 1669. I had another occasion to bleed, but though the Phenomena of my blood upon the Mothers of Salt peter were the same as at first; yet in the other mixture with Salt-peter-liquors, they were not: the blood separately taken seemed not to differ from the former, only the Serum was a little yellower: it did burn as well as before, but crackled much less. At the same time I caused an old man to be let blood for a catarrh and pain in his shoulder, which he used to ease with bleeding; the blood seemed very good and well-coloured; after it had stood a while I had the leisure to view it, and upon one pottinger of coagulated blood, I poured twenty drops of spirit of Vitriol, whereupon immediately all the top turned as white as milk, even the bubbles which seemed of blood before: whereupon I took another pottin-ger, and separated half the blood from the Serum, and poured on the blood and Serum some spirit of Vitriol as before: presently all the Serum became of colour and consistence like milk: the blood turned black, and hardened into a substance that cut like white-washed-wax: the other, at my return, I found of the consistence and colour of a common mustard. The vi-
triated

vitrified Serum would not flame: the *vitrified* blood did burn with a *brisk* but *short* flame: the *simple blood* would scarce burn at all, but with an *hovering* and *discontinued* flame.

I took also some of the pure *citrine* Serum of my blood, which tasted not very *salt*; I set it in the window for some time: during the *frost* it coagulated into a body of the *consistence* of *butter* in the heat of *Summer*: it gathered no *lea* at all: the colour became less *citrine*; but still *pellucid*. I set it after some days to thaw; which it did immediately before the fire, but came not to its former *fluidity*, but like *oyle*: after that, it coagulated with the warmth *before the fire*, and seemed exactly like to *boyled Turpentine*, but that it wanted the smell: it would not flame at all (though crackled much, as salt) yet I brought it to *ignition*.

I did also take some *Hogs blood* again, and poured on the *Mother of Peter*, it mixed not; only after some days some *filamentary corpuscles* subsided unto the middle of the liquor: the colour at first was a *pale bastard scarlet*: but after a day it turned to a *darkish red*, and so continued many days; and in its primitive fluidity, it suffering not any alteration, but being as *fluid* as when it first issued from the *veins*: it stood in the window all the *frost*, not changing or freezing at all. No more did another *pottinger* of my blood that was mixed with the liquor of *Peter* which had *past the ashes*: but that last blood turned very *blackish*.

In fire, notwithstanding any thing I have done or purposed about the nature of blood, I do now desist from the Enquiry: the result of my thoughts being *this*, that there is a continual variation in the blood upon every disease, and often without it, during a *state of health*: that the blood of *Individuals* of the same kinde differs not only from it self, but in each other individual: that no man can by reason of this consideration know what he would *transfuse*; nor what it is he would *rectifie*. In a word, that 'tis most prndential to insist upon *Experienced Methods* in *Physick*, and that all *phancies* about *spirit, salt, sulphur*, fermentative fires in the heart, occasioned by *heterogeneous mixtures*, and the expli-
cations

plications of the operations of *Medicaments* by the *new Philosophers*, either *Chymical* or others, are all *vain*, and cannot be allowed as a *ground of practice*, till justified by *successful trials*; seeing that not only the *suppositions* are false, but whilst the *blood* is *subdiminuo anima*, effects upon it are *different* from what when it is *separate*: and I think I may thence *conclude* rationally, that 'tis not conceivable that the *fabrick* of our bodies is purely *Mechanical*: for the *liquors* would have the same effect on the *blood* in the *body*, and *without*: which *they* have not.

A REVIEW of the precedent Discourse against Mr. GLANVILL.

AFTER I had written the present *Discourse*, I was so unwilling to give any offence to the world, and so apprehensive lest my just indignation for the affront Mr. Glanvill had put upon my Faculty, should transport me beyond all fitting moderation, that I desired a Friend, (without further advising with me) to blot out whatever he might in prudence think equitable; by reason of his great cautiousness, as well as thorough that great haste and continual interruptions wherein the Treatise was penned; I finde several passages either omitted totally, or not sufficiently explained; so as that I could not acquiesce in the publication thereof, without some few additions, partly to prevent some cavills that might (though weakly) be raised against it, and partly to put every thing past dispute hereafter; that so I might not have any further occasion to write against our Virtuoso, nor his Abettors have any thing to do but to call in his Libell against the Physicians, and do some reasonable justice to those he had so arrogantly and injuriously insulted over. I desire my Reader to pardon me, if I have not in some circumstantial embellishments and regularity of procedure answered his expectation, since in the main I am sure I have out-done it.

Whereas I charge Mr. Glanvill (page 2.) with not having read the Authors which he mentions. These words, *Who can chuse but smile, when he reads how Apulcius improved the Mathematicks after Euclide?* the whole passage should have run thus; *Who can choose but smile when he reads how Apuleius improved Arithmetick?* All that Apuleius did was to so translate something about Arithmetick into Latine, at such time as the Latines had no other Numerals then L. M. D. C.

&c.

And by reason of this performance of his doth Vossius give him a place amongst the Authors, not improvers of Arithmetick: and takes notice of him as the first that ever writ in Latine about that subject. Upon which account it was judiciously done of Vossius to mention him there; but Mr. Glanvill is grossly mistaken here to name him, where he treats of such as advanced useful knowledge; which a bare Translation doth not. It is true, Vossius saith of Apuleius,

Vossius de Sci-
ent. Mathem.
c. 51. sect. 1.

Apuleius Arithmeticon Nicomachi Ge-
raeni Pythagorici Latine transtulit teste
Cassiodoro de mathem. discipl. cap. de A-
rithm. & Isidoro Hisp. Orig. liij. a Joss. de
script. Hist. phil. l. 3. c. 13. p. 280.

Primus Arithmeticon Latinis literis
illustravit: which words import no
more then I say; and 'tis manifest,
that what He did was but a Translation
of Nichomachus. So Cassiodorus de

mathem. disciplinis. cap. de Arithmetica. Reliqua disciplina
indigent Arithmetica disciplina, quam apud Græcos Nicomachos
diligenter exposuit. Hunc primum Madaurensis Apuleius,
deinde magnificus vir Boethius Latino sermone translatum
Romanis contulit legendum. The same is asserted by Isi-

Vossius de Sci-
ent. mathem.
c. 10. sect. 4.
Blancanus Ma-
them. Criti-
bol. secul. 15.

dorus Hispalensis. This might our Virtuoso have observed in
Vossius, when he read him: and what Apuleius performed is
so meanly thought of by Blancanus, that in his Chronicles of
Mathematicians he affords him no place, though he mention
the Arithmetical work of Boethius. The imputation I fix
upon Mr. Glanvill, for not understanding what the Authors he
mentions had writ, and about his not having ever seen them,
is manifest to any man that shall not only trace him by Vos-
sius, but consider the ridiculous characters he fixeth upon
the Writers alledged, viz. Ptolemy of Alexandria made con-
siderable improvements in Optics: and Albaxenus the Ara-
bian is famous for what he did in it. From these Vitellio drew
his, and advanced the Science by his own wit and their helps.

Vossius de sci-
ent. Mathem.
Mr. Glanvill
p. 47. 48. &c. 3

* S. Stevinus both invented and writ such
in all parts of the pure and practical Mathe-
matics, in Geography, Geometry, Naviga-
tion, Mechanicks, &c. that never did any
one, no, nor all the Virtuosi in England or
Europe, ever equalled, or pursued: From
hence 'tis apparent Mr. Glanvill, and his
Abettors never read him: he was the first
Proposer I know of, and before my Lord

* Stevinus corrected Euclid, Achazen,
and Vitellio, in some fundamental Pro-
positions that were mistakes; and
in the room substituted considerable
inventions of his own. Roger Bacon
writ acutely of Opticks. — Any man
will grant, that he who gave so lame

an account of these Authors, never was acquainted with them, nor understood particularly what they writ, or added of their own invention: whether

Bacon. of a Society to carry on Experiments in order to the rectifying many errors, and improving many known truths: as Admirer of the Ancients, and their learning.

new theoremes, or different and new demonstrations of old known truths. Whereas he saith that Roger Bacon was accused of *Magick* to Pope Clement the fourth, and thereupon imprisoned: but the accusation was founded on nothing but his skill in *Mathematicks*, and the ignorance of his Accusers. — Assertions of this nature are not so easily passed by, so many learned and judicious persons having reckoned him in the number of *Magicians*; such are *Joannes Wierus* and other *Demonographers*. That the said Writer might declaim against *Magick*, or deny the possibility of it, and yet practise it, is an usual procedure with (a) that sort of people: and that his works have in them sundry Propositions that are superstitious and magical is granted by *Delcia*; such haply was that which *Franciscus* (b) *Picus* says he had read in his book of the sixth Science, where he affirms, that a man may become a Prophet, and foretel things to come by the means of the Glass *Almuchi*, composed according to the rules of perspective, provided he made use of it under a good constellation, and had before-hand made his body very even, and put it into a good temper by *Chymistry*.

J. Wierus de præstigiis l. 1. c. 1.

a Vide Badian. in præf. ad demonomaniam.

b See Tabr. Naudæus his History of *Magick* ch. 12.

As to what I say about *Orontius*, I adde the words of Sir H. Savile in his Lectures, p. 71. *Josephus Scaliger* — homo omnium mortalium, ne *Orontio* quidem excepto, ἀνεπιστητότατος.

Whereas I say (p. 3.) that the ancient Physicians did not only cure cut-fingers, and invented *Diapalma* and other Medicaments in order thereunto. I adde (what I know not how was omitted) that it is notorious how all our *Herbals* and *Druggists* have explained the nature and use of Medicaments according to the Doctrine of the Elements, and qualities either arising therefrom, or from the peculiar mixture of the parts: and who-soever hath acted, or shall proceed according to those notions in compliance with the Ancients, shall not stand in need of

any novel Method from the *Virtuoso* to save a cut-finger.

What I have said in the first and second sheet concerning the *Barometer* (as they call it) that it doth not determine exactly, neither the weight nor pressure of the aire, winde, or clouds, is an opinion which the more I think upon, the more I am confirmed in; nor do I doubt that others will be as scrupulous as I in their assent to our dogmatizing *Virtuoso*, when they shall seriously consider what follows, and accommodate it to the *Elasticity* and gravity of the *Atmosphere*.

First, when our *Virtuoso* speaks of the *Elasticity* of the *Air*, he understands thereby a body whose constituent particles are of a peculiar configuration and texture, distinct from what can be ascribed to earth, water, or fire? "That the *Air* near the earth is such an heap of little bodies lying one upon another, as may be resembled to a fleece of wool; for this (to omit other likenesses betwixt them) consists of many slender flexible hairs; each of which may indeed like a little Spring, be easily bent or rouled up; but will also, like a Spring, be still endeavouring to stretch it self out again. For, though both these Hairs, and the *Aerial* corpuscles to which we like them, do easily yield to external pressures; yet each of them (by virtue of

Mr. Boyle in his first part of Experiments of the Air: Exprim. 1.

I desire my Reader to take notice about the *Elasticity* of the *Air*, that the very names of *Elaster* and *Elasticity* are of a more ancient mention then the being of the *Society*: *Regius* and *Paequetus* use the term: and that as to the expansive motion of the *Air*, 'tis propounded by several *Cartesians*, and before them by *Kircher de mayner*, l. 2 part. 1. propo. 3. See also *Mersenn.* and *Schottus* mechanic pneumat. hydraul: So that the *Society* can pretend to nothing but the similitude of a fleece of wool, and the explicating it by that way.

Page 55.

"hand more or less, the compressed wooll does as it were spontaneously expand or display it self towards the recovery of its former loose and free condition, till the fleece have either regained its former dimensions, or at least, approved them as near as the compressing band, (perchance not quite opened) will permit.

permit. — Against this I except not only that this *supposition*
 is far from a *sensible Philosophy*; but that whosoever would
 weigh the *Air* exactly, and estimate the accession of weight
 which the *Air* receives from winds, clouds, or vapors (the thing
 Mr. Glanvill promiseth us) must weigh the *Air* singly first,
 and in its utmost degree of expansion, otherwise he can never
 tell what its gravity is, or what accessional it receives by its
Elasticity, by exhalations and different mixtures: But this
 is not done by the *Barometer* (however it be essayed in the ex-
 periment of *Aristotle* very judiciously) but only an imaginary
 column or *Cylinder of Air*, and its pressure upon the *Mercury*
 is considered: which procedure seems to me as ridiculous,
 as if a man should lay a fleece of wool, or any other body up-
 on any thing, and there being above that an incumbent body
 of lead (or the like) bearing thereon, yet should he proceed
 to say that he weighed the fleece of wool and not the incum-
 bent lead: for as yet no discoveries have acquainted the
 world with the nature of that *Aether* which is above the
Atmosphere, whether it gravitate or press upon the subjacent
Air (which a very subtle but rapid body may do) nor what
 effects the *Libration* of the *Moon* and other *Planets* may
 have by way of pressure upon the contiguous bodies, which
 pressure may be communicated to the *terrestrial Air*: and
 without the determination hereof, it is as vain to pretend
 to weigh the *Air* by this *Barometer*, as to determine of the
 weight of a board that presseth a *Cheese* in the *Vat*, without
 considering the *superincumbent* stone. Neither are we in-
 formed sufficiently what the *Figure* of the *Aether* is, whe-
 ther it make a *convexe* and so encompass the *Atmosphere*; or
 also be interspersed with, and differently move therein; nor
 what effects those motions and agitations of it have upon the
 grosser corpuscles of the *Atmosphere*, (not only in abating of
 their gravity sometimes, but adding to them a *levitation*: nor
 is it explicated yet what effects the corpuscular rays of the
 fixed *Stars* and *Planets* may have in or upon the *Atmosphere*,
 adding to its gravity, (as 'tis just to imagine, since that emi-
 nent *Virtuoso*, the *Pliny* of our Age for lying, but a *Virtuoso*!
 could wash his hands in the beams of the *Moon*) or *Elasticity*,

Thus the *Moon*
 according to
 the *Cartesians*
 by its pressure
 upon the wa-
 ters, causeth
 the Tides on
 Earth.

Mr K. D. of
Simp p 43.
Charlton de
fulm no.

of which those *intercurrent* corpuscles seem not void (though not *Airy*) which constitute *Thunder, Lightning, &c.* or diminishing them both in order to the *Phænomena*, which occur daily.

Secondly, it doth not yet appear by any thing alledged by our *Experimental Philosophers*, that for certain the Air which encompasseth the Earth is a distinct body of a different structure from the Earth and Water that compose the *Terraqueous Globe*. Isaac Vossius doth think the Air to be nothing

If Vossius de mo-
to mar. &
vent. cap p.
54.

else but watrish exhalations drawn up by the Sunne. — “*Credimus Aerem esse Aquam seu humorem dilatatum, ad legem æ-*

“*quilibrium quaquaversum se extendentem.* If it be so, it is a

Aeris elementum juxta sacra eloquia nihil aliud est quam tan id: quædam perpetuo occurrentis subtilissima & spirabilis substantia. Kircher, Perceptor. 2. dial. 2. c. 3.

The Air seems nothing else but a kind of tincture or solution of terrestrial and aqueous particles dissolved in the *Æther*, and agitated by it, just as the tincture of cochineal is nothing but fine finer dissolved parts of that concrete lck'd up or dissolved by the fluid water. Mr. Hook Microgr. obs. p. 11. *Atmosphæram ex haliis retentibus & vaporibusque adspersis solis & reliquorum Astrorum constituti, inter duos converterit. Hæc eandem Atmosphæram, ab solis & reliquorum Astrorum conversiones variæ mutæ & ite perari apud eosdem indubiam est. Scheiner per vagio l. c. p. 1. c. x.*

vain supposition which attributes such a structure to the Air, as is repugnant to the water: Others there are which make the *Atmosphere* to be an aggregate of heterogeneous particles exhaled from this *Globe*, whose structure must be as discrepant as the vapours are: and what a difference there is in them we may guess by the infinite variety of *Meteors, Rains, Snows, Hail, Winds, Dews, &c.* and their component corpuscles. If this latter be true, (as 'tis probable that it is; at least that there is no more besides but an intercurrent *Æther* or *materia subtilis* of

the *Cartesians*) what becomes of this *Elasticity*, or pressure of this *Springy Air* so much talked of?

Thirdly, 'tis necessary to distinguish betwixt the pressure and weight of bodies: for, suppose were a man pressed under a bended stick, or other springy body compressed, he shall feel a great oppression upon him, and be kept down to his great pain, not with the weight but spring of the said stick, or other springy body: and whosoever by the violence of the compression would judge of the weight of the incumbent body, would expose himself to laughter.

Fourthly, 'tis possible for a body without any springiness or

or *accessional gravity*, to press downwards above its weight: thus a needle touched with a *Loadstone* declines from that line in which it hung parallel to the *Horizon*, without any addition of weight: which is demonstrable from the variety of its declination and *reflexion*: and 'tis as indubitable that such declination of it carries with it something of *pressure*.

Fifthly, we are to consider the nature of the *Earth*, whether that be a *Magnet*, or no: for if it be such, (however the *Magnetism* be explained, whether according to the *Cartesian Hypothesis*, or that of *Berigardus*) instead of weighing the *Air*, we deceive our selves as grossly as if we took the impulse with which *Iron* runs to the *Loadstone* for its weight: and thus in some cases we shall weigh things by their ascent, which is inconsistent with the common notion of weighing things.

Sixthly, to wave the *unestablished* notions of *Gravity* and *Lenity*, and to abstract from all the preceding considerations, I say, that even so this opinion of the *Aerial Column* pressing down upon the *Mercury* is false: since in a body so *unequally mixed* as the *Air* is often (and it cannot be disproved that 'tis ever otherwise) it is impossible to imagine that the *pressure* or *gravitation* is by way of a *Column* or *Cylinder*. Imagine the *Experiment* to be tried by six or more weights pressing at one time upon the *Mercury*, would any man in his wits say, that this joint *pressure* were *cylindrical*? consider but the variety of mixtures in the *Air*, (and the separate pressures that are consequential thereunto) which the contemplation of the clouds will lead us into, and 'tis the same thing. Were a man swimming in that concourse of water in *Hungary*, where the *unmixed* rivers flow in one channel, and his body so placed that part of it were in one stream, and part in another, would you say that the incumbent water did press upon him in a *Column* or *Cylinder*? But to proceed further, if it be true that the superiour part of the *Air* or *Atmosphere*, which transcends the mountainous asperities of the *Earth*, hath another motion or lation then that which is more low,
(explain

Acum omnino parallelum horizonti, quae subito atque magneti applicatur, nullo modo sit gravior, tamen deprimitur, perinde ac si magnes esset acui subiectus. Finge nunc aliquem, qui haec a magne fieri nesciat, in profectis crederet cum Aristotele acum tendere ad centrum mundi. Berigard. de terra: cap. 10. §. 6. part. 3.

Vide Galila-
um system.
c. sm dial. 4.
1² 8 32. edit.
in 4^{to}.

(explain it either the *Aristotelian* way, or according to *Galilaeo*, and agreeably to the *motion of the Earth*) if this be true, (as I take it to be now) how can we determine of the *Gravity* of the neighbouring *Air* by this *Experiment*? and how vain is this notion of a *Cylinder*? for in a *fluid* agitated with *different motions* as the subject *Air* is by *repercussion* from the *Hills* and *Plains*, (which begets *vibrations* and *undulations*) God knows what it suffers upon the *generation* and *motus* of *Meteors*; and where the *superior* part hath a *motion* different oftentimes from the *other*, of whose *rapidity* we are as uncertain as of its *structure*, and *texture*, (and we see that the *rapidity* or *swift motion* of an *heavy body* takes it from its *pressure* and *gravity*) how can any man talk of *Aerial columns*, much less pretend to weigh the *Air incumbent*, and to determine exactly of any *accession of weights*, as *M. Glanvill* professeth to do? Besides, if *heavy bodies* do not *gravitate* in a *straight line*, but describe the *circumference of a Circle*, or some *such line*, (as new *Philosophers* hold in opposition to *Aristotle*) and if the *Atmosphere* be to

* Vide Galileum de system. mundi dial. 2. pag. 119. edit. in 4^{to}. Sectariorum Copernici opus est dicere (quippe qui ponunt orbem magni circulo ferri) motum gravi deorsum esse per lineam curvam vel instar quadratricis Nicomedis, vel circulari ut Galileus contendit. Scipio Claramont. de univers. lib. 1. c. 20.

be reckon'd amongst the *bodies* that *gravitate*, how can we imagine this *gravitation* to be performed by way of a *column* or *cylinder*? Moreover, this *Atmosphere* can no way be considered to press *cylindrically*, if we consider

that in every part of it there are continual *exhalations*, and *smoke* ascending through it, so that the *weight* of it must needs be *abated* by the *ascent* of those *vapors*: and what we *experiment* here is not the *weight* of the *Air* properly, but the *super-ponderancy* or *over-weight* of it. The *Atmosphere* seems to me constantly to resemble a *Glass* in which *water* is poured on *wine*, and the *wine* is ascending thorough each part of the *water* indeterminately; if it be thus, and that the *ascending vapours* carry a *great force* with them, (which any man

Vide Sandorii medie. static. Hanc aeris concitationem demonstrat vel ipsa saliva ex a^o to demissa, quæ dilaceratur prope terram in quam concitatus aer impingens ad salivam redit, eamque discerpit. Berigard. circ. Pisat. part. 3. circ. 6. de terra.

will grant who considers the *weight* of the *smoke*, in comparison to what remains of the *wood* and *coal* that is burnt: and who *statically* regards

regards the *steam* transpiring from our bodies: and how that *spittle*, which in an *entire body* issues from our mouths: descends till near the ground it be *dissipated and distended*) I cannot imagine how it can be said that we *thus measure all the degrees of compression in the Atmosphere, and estimate exactly any accession of weight which the Air receives from winds, clouds, or vapors.* To conclude, if the *Air* do thus press upon the *Mercury*, how comes it to pass that there is no difference when the *Experiment* is tried in a *chamber* (where the incumbent *column* is less then *abroad*) and in the open *Air* of the same *levell*? Why doth it not press up *water* (or other *liquors*) in the like *Syphon* to an *height* as different as is the *disproportion* betwixt the *gravity*

Why doth not this *Cylinder of Air* which so presseth upon the *Mercury*, depress a *leaf of Gold*, but it raises it to rise up and down?

of *Mercury* and *water*: which I have not heard it doth; yet the proportion betwixt *Mercury* and *water* in *gravity* is 16. 134. In fine, how is that true which Mr. *Hooke* saith, viz.

"That he contrived an *instruwent* to shew all the *minute-varia-*

Mr. Hooke in the Preface to his *Micra-*

"tions in the pressure of the *Air*: by which he constantly found,

crap by

"that before and during the time of rainy weather, the pressure

"of the *Air* is less, and in dry weather, but especially when an

"*Eastern* winde, (which having past over vast tracts of *Land*,

"is heavy with earthy particles) blows, it is much more:

"though these changes are varied according to very odd *Laws*.

If this be true, (as I am apt to believe it is) with what face

can our *Virtuoso* tell us. "It is concluded, that such a *Cylin-*

Page 51.

"der of the *Air* as presses upon the *Mercury* in the vessel, is

"of equal weight to about 29 digits of that ponderous body in

"the *Tube*. Thus it is when the *Air* is in its ordinary temper:

"but vapours, winds and clouds alter the *Standard*, so that

"the *Quicksilver* sometimes falls, som-

"times rises in the *Glass*, proportion-

"ably to the greater or less accession of

"gravity and compression the *Air* hath

"received from any of those alterati-

"ons; and the degree of increase beyond

"the *Standard*, is the measure of the

"additional gravity. Is not this pret-

If you would see how true Mr. *Glavill* speaks, read Mr. *Boyle* his eleventh *Experiment* and the defence of it against *Linus*: there you will find that the *Mercurial Cylinder* did in winter sometimes correspond with the *weather Glass* and sometimes vary: and the reason Mr. *Boyle* gives, is such as takes off from the certainty of Mr. *Glavill's* CONCLUSION.

tily said by a man that writes a year after Mr. Hook, and more after Mr. Boyle? How unacquainted is He and his *Assistants*, even with the *Writings* of their fellow-*Virtuosi*? And if we may be allowed to transfer the *Fool's Cap* from the *Ancients* for concluding too soon, may we not crown the heads of our *Virtues*, now therewith? And how careful the R.S. is in making good their promise to *Olaus Borrichius*, that what their *Members* should write, the whole *Society* would be responsible, let any man judge that considers how Mr. Hooke, and Mr. Glanvill (I beg Mr. Hook's pardon for the unequal comparison) disagree; and Dr. Henshaw (another *Virtuoso*) differs also from Mr. Glanvill, saying, That the *Quicksilver Tube* will not give so exact an account of every small difference in the pressing Air, as the THERMOMETER! what confusion shall we be reduced unto in time, should these contradictory Experimentators proceed as they have done! I shall here adde, that I do conceive that this notion of an *Aerial column* gravitating upon the *Earth*, or subjacent body, was framed in imitation of the *Hypothesis* of Simon Stevinus, the Teacher of *Mathematicks* to Grave Maurice of Nassau, in his fourth book of *Hydrostaticks*, where he insists much upon this *Aqueous Column*; but 'tis observable that that judicious person, the better to make out his *Theoremes*, presupposeth such things as give some repute to my objections about the *Aerial Cylinder* or *Column*, viz.

1. *Aquam omnibus partibus esse ponderitatis Homogenea.*
2. *Cujusvis aquae superficiem planam & horisonti parallelam esse.*
3. *Aqua fundo horisonti parallelo tantum insidet pondus, quantum est Aqueae Columnae cujus basis fundo, altitudo perpendiculari ab aquae superficie summa ad imam demissa sit aequalis.*

Out of this last *Proposition*, and the *demonstration* and *consequaries* thereof in him; 'tis manifest, that he supposed not one of his assertions would hold, though the *Phanomena* were the same in nature) as he worded and explained them, if

if that he did not free his *aqueous Column* from any oblique pressures, and make it rectangular. And as for his *Postulat-um*, that the surface of the water is plain, flat and level; he confesses it is not so really, viz. *Quatenus pars est sphaerica sua mundanae superficiei; mundanam autem superficiem dicimus sphaera cujusvis mundi concentrica*: he only professeth to assume it as true, because in *hydrostatics*, things happen as if it really were so; whereupon he scruples not to make use of a supposition, which is really, confessedly, and demonstrably false, as long as it conduceth to practice, and serves his turn as if it were true, without pursuing a more tedious, and not more useful Hypothesis agreeable to *Archimedes*. Which I take notice of by way of *Apology* for my self, and those who think fit to acquiesce in, or not to blame such Methods as are effectual, though otherwise vain and groundless. Another thing is, that He supposeth there that the Earth is the Center of the world. Out of all which I am more and more satisfied of the validity of my former doubts against this so much concluded upon Aerial Column, to the explanation whereof I finde no such cautions, or previous suppositions used, to take off the edge and force of such objections: neither indeed have I yet met with any thing of that subject proposed in a *Scientificall* way; and therefore much how it comes to be concluded upon so as Mr. *Glanvill* represents it to be.

Stevinus hydrostat. E-lem. l. 4. Theorem 2.

Id. lib. postulat. 6.

Id. ib. postulat. 7. Et professio tam receptum fuerit hac ipsa non admittit, quam postulantis Astrologis terram esse mundi centrum. Idem derogare.

Whereas I have said, that the gravitation of the Air (even Elementary) is an opinion of *Aristotle*, and that his Experiment was tried by *Glaramontius*; I adde, that the verity of that trial (though indeed it extend only to the impure Atmosphere) is attested by *Ricciolus* in these words, "*Duo quarto Aquam, & Aerem nostrum habere aliquid levitatis gravitatis admistum, ut villius adscendant, ut sint supra id quod est ipsis gravius; & vi hujus descendant. Hinc fit ut folles lusorii, & Aere addensato bene inflati, etiam sine fari-nula ac vim infusione, plus ponderent, quam flaccidi: ut ex-quista trutina deprehendas: immo ego expendi vesicem bo-vinam, quae flaccida erat scrupulorum 4. & granorum quatuor, esse inflatam scrup. 4. grav. 6. quare Aer additus per inflationem appendebat grana duo.* Thus the incomparable

Ricciol. Al-mag. nov. l. 2. c. 5. sect. 4.

a' Against
Hobs c. 3.

8 Experiments
of Air. Exper.
6. and against
Hobs c. 3.

Democrit. re-
vivisc disp. 1.
c. 3. p. 84 in
4to.

Circul. Pisan.
part. 6. circ. 7.
de nutritione.

Sancto-
nus de pulmon. sect. 3. p. 60.
1115 WAS a
Galeenist.

Ricciolus, whom I may as well reckon amongst the Peripateticks, as Mr. (a) Boyle doth Schottus: and how true that Aristotelean Experiment is Mr. Boyle demonstrates in his (b) pneumatick discourses. And though the works of Galileo, Kepler, Mersennus, Gassendus, Pecquetus, Paschal, were lost, and were as ignorant as some Virtuosi of their trials about the weight of the Air; yet would not the Assertion have seemed so strange and incredible as Mr. Glanvill represents it to be; for though Maynenus deny it, yet he brings in this Objection. "*Aer est gravis, &c. go. probatur primo a Mathematicis, qui de Aeris pondere scripserunt, inveneruntque ejus ponderis momenta.*" 2. A Francisco Mendoza, "*qui in suo viridario problema instituit, An in Aere navigari possit?*" 3. A descensu lapidum & aliorum gravium, "*qua Aeris pondere pragrammata urgent suum descensum, & velocius in fine quam in principio moventur.*" 4. Experimento adueto a Bassone, "*qui follem inflatum citius descendere ait quam Aere vacuum, ob additum Aeris pondus.*" l. de motu. in tent. 1. art. 3. Berigardus also asserts the gravity of the Air, and justifies it by this Barometer, and the unequal ascent of the Mercury on the top, and at the foot of a mountain. I shall summe up all, that may take off from the novelty of the thing, and deprive the R.S. of the glory of pretending to any interest in the discovery in the words of Thomas Bartholinus de pulmon. sect. 3. p. 60. "*Ingeniosus Sanctorius in inveniendis instrumentis Medicis, inter alia Com. in 1 Fen. A. vic. Statera ponit, qua ventorum vim & impetum ponderat. Inventis aliquid addam. Vitream phialam lanci nostrae impone, & leni halitu inflato videbis quam parum ponderi accreverit. In instrumento Magdeburgico testatur Otho Gerichte Consul Magdeburgensis, & inventor ejus, ponderari posse Aerem hoc pacto; quanto levius est vitrum post Aerem extractum, tantum ponderabat Aer antea in eo contentus. Varios modos alios Aeris levitatem bilance expendendi tradit Caspar Ens Thaumaturgus. Mathemat. Probl. 93. c. 15. Vesicam bovinam se expendisse ait Joannes Bapt. Ricciolus Tom. 1. Almag. nov. l. 2. c. 5. num. 4. qua flaccida erat scrupulorum quatuor & granorum quatuor: & deprehendisse eandem inflatum scrupulorum.*"

"lorum 4. & granorum 6. *Marcus Mercennus in Phanom.*
 "Propos. 29. *afferit se Geometris præsantibus & adjuvantibus*
 "ponderasse bilancæ *Æolipilam* anciam satis calefactam, &
 "propemodum candentem, omnique humore destitutam & quam
 "minimum Aeris continentem; deprehendisseque pondus fu-
 "isse unciarum quatuor, drachmarum 6. & granorum 15.
 "postquam vero naturaliter refrigisset *Æolipila*, & Aer an-
 "tea rarefactus rediisset ad pristinam ac naturalem suam sta-
 "tum, iterum ponderasse ipsam, & invenisse pondus præcedentæ
 "pondere majus fuisse quatuor gravis. Plura in hanc rem con-
 "gessit. cl. *Casp. Schottus in Mechan. p. 1. protheor. 4.*
 "e. 6.

I have not *Schottus* by me at present; neither is there need of any further Inquiries; for I have sufficiently demonstrated that the Gravitation of the Air is an opinion of *Aristotle*, *Averroes*, and other *Peripateticks*, though not generally received by that sort of Philosophers: and that it was truly and experimentally demonstrated by them, especially as far as the Atmosphere is concerned in the Question. I have also made it apparent, that the Barometer, or Mercurial Experiment doth not discover the weight of the Air with any certainty; much less, all the degrees of it: That the pressure of the Air is not by way of a Cylinder or Column; and that the Barometer had not its original but denomination from the R.S. they were, as I may term them, the Godfathers, not Parents. The World may justly say of the Honourable Mr. Boyle, that he hath improved the Experiments of his Predecessors, and represented them more accurately; and of Mr. Glanvill and his Assistants what it pleaseth.

In the marginal note (page 15.) where I say, that perhaps it is not true that *Aristotle* had any hand in, or was privy to the poisoning of *Alexander*; I add that *Pausanias* after he had spoke of the Stygian water, and its strange property, doubts whether *Alexander* were made away by such means, or no: *Σαφὲς μὲν οὐκ ἴδεν· ἀνέροισιν δ' ἴδεν.* This he says (in *Arcadic*) without reflecting any way upon *Aristotle* as one concerned in the report. And *Arrianus* who writ the life of *Alexander*, out of the *Memoires* of *Ptolemaus Lagides*

(who was present when that great *Prince* died) avows, that he died of a surfeit: yet he relates sundry rumors about his death, one whereof is, that *Aristotle* (being fearful of *Alexander* after the death of *Calisthenes*) should prepare the poison for *Antipater*, to be sent him: but concludes thus, ταῦτα ἔμοι, ὡς μὴ ἀγνοεῖν δόξαιμι μάλλον ὅτι λεγόμενά εἰσι, ἢ οἷς πιστέειν ἀφ' ἡσιν ἀναλεῖσθαι. *Arrian. de expedit. Alexandr. l. 7.*

Mr. Glanvill
p. 25.

Whereas I reflect (page 16.) upon that passage of *Plato*, Ὁ Θεὸς γεωμετρεῖ, and what Mr. Glanvill saith, "That without Geometry we cannot in any good degree understand the Artifice of the Omniscent Architect in the compofure of the great World and our selves: and that the Universe must be known by the Art whereby it was made." There should have been a Chafme made for some passages, I know not why omitted. I adde therefore, that it is not revealed unto us that God made the Universe according to that Art, and it seems an Additional to the first *Fiat*, or let there be— in *Genesis*, to say his commands were regulated by the rules of Geometry, and his powerful and omnipotent word confined thereunto. Had Mr. Glanvill been pleased to consult the fathers, he would have found that this Tenet of his is no primitive notion: and that particularly *Eusebius* hath refuted it, denying that God in his Works is obliged to Geometrical numbers; and that *Socrates* (whose authority is greater then *Plato's*) did place no great value on those Sciences: that the first *Christians* did slight the knowledge of them as useless to Piety and knowledge of God; because my opinion about these things is agreable to that of the first *Christians*, and of *Socrates*; I shall insert the whole passage, as it is translated into *Latine* in the *Paris Edition*.

Euseb. de
prep. Ev. ing
l. 14 c. 4.

Euseb. prep. Evangelica l. 14 c. 10, 11. edit. Paris. 1628.

Primum tamen quoniam *Mathematica* illa sua tantopere jactare solent, prorsusque necessarium esse dictitant, ut quisquis comprehendendi veri studio tenebitur, *Astronomiam*, *Arithmetriam*, *Geometriam*, *Musica*, illa nimirum ipsa, quæ ad eos a *Barbaris* profecta esse jam ostendimus, persequatur:

quatur: (his enim qui carebit, *doctum perfectumque Philosophum* esse neminem, imo rerum veritatem ne primoribus quidem labris digustare posse, nisi qui *harum* ante rerum animo cognitionem impresserit:) deinde hanc suarum artium peritiam magnificentius ostentantes, æthere sese medio sublimies propemodum incidere, *numerisque suis* ipsum quoque *Deum* circumferre arbitrantur: nos vero qui *similium disciplinarum amore non flagremus*, nihil a *pecudibus* abesse existimant, *deique* propterea nunquam nunquam *rei paulo gravioris notitiam percepturos* esse pronunciant: Age, hoc ipsum quam pravum sit, atque distortum, vera laminis loco ratione proposita, sic tanquam ad libellam & regulam exigamus. Erit ea quidem ejusmodi, quæ Græcos, innumera- biles, infinitosque Barbaros complexa; alios tametsi *his artibus doctrinisque paratos*, nec *Deum* unquam, nec *bonæ vitæ rationes*, nec omnino præclarum & utile quid percepisse; alios, ut ab omnium disciplinarum studio destituti essent, *religiosissimos* tamen ac *sapientissimos* extitisse demon- strent. Enimvero quænam hoc in genere *Socratis* illius, qui ab istis omnibus tantopere celebratur, sententia fuerit, e *Xenophonte* intelliges, si modo ei suis in *Memorabilibus* hæc scribente fidem adhibebis.

“Docebat, inquit ille, præterea, quatenus cujusque rei
 “peritum esse hominem *bene institute* oporteret: principio
 “*Geometrica* dandam catenus operam esse dicebat, ut si
 “quando res pasceret, dimensam rite terram vel accipere ab
 “alio, vel alii tradere, vel eam dividere, vel opus aliquod de-
 “signare posset. Id porro tam esse ad discendum facile, ut
 “qui dimensionem attendere voluerit, idem simul & quanta
 “sit terræ magnitudo assequi possit, & quænam ejus metien-
 “dæ ratio breviter admodum expediteque cognoscere. At
 “eiusdem in *Geometrica* studio, ad illas usque descriptiones
 “intellectu difficiliiores quæquam progredi, *Socrati* non
 “placebat. Cui enim *bono* futuræ illæ essent, videre se, ta-
 “met si ne illarum quidem imperitus esset, rogabat. Enim-
 “vero, ad exhauriendam hominis vitam cum satis illas esse,
 “tum aliarum interim & plurimum & *utiliorum doctrina-
 rum* studia impedire. *Astronomiam* similiter catenus com-
 plecti

"plecti solum jubebat, ut *noctis, mensis, annique tempora*
 "cognosceres, atque hujus cognitionis ope, siquando vel
 "iter, vel navigatio suscipienda esset, vel agenda forent ex-
 "cubix, vel in aliud quidlibet quod noctis, mensis, annique
 "spatio fieri solet, incumbendum, signis ad ea omnia suis
 "quæque temporibus obeunda, certioribus uterere. Atqui
 "hæc nihilo difficilius tam ex nocturnis venatoribus, quam
 "ex navium gubernatoribus, & aliis quamplurimis resciri
 "posse, a quibus eorum peritiam suæ cujusque partes offi-
 "ciumque deposcat. At eandem artem eo usque persequi,
 "dum ea quæ non eodem motu circumferantur, stellasque
 "simul errantes & vagas distinguere noveris, adeoque in ea-
 "rum abs terra intervallis, conversionibus causisque riman-
 "dis ætatem viresque consumere, id vero graviter imprimis
 "ac serio prohibebat, quod *multum hujus etiam opere preti-*
 "um videret, tametsi ne in istis quidem rebus hospes ipse
 "ac peregrinus esset. Addebat, conficiendæ hominis vitæ
 "illas quæque satis futuras, quæ interim a pluribus *utiliori-*
 "busque studiis avocarent. Postremo quibus *cælestia* quæ-
 "que rationibus *Numen* moderetur, investigari nolebat,
 "quod cum eo ab hominibus aspirari non posse, tum minus
 "cum diis præbæri existimaret, qui quæ prompta notaque
 "esse noluisse, inquireret. Nec minus illi, quem ea ve-
 "hementius cura destineret, *insania periculum* imminere di-
 "cebat, quam *Anaxagora*, qui explicatus a se deorum Ma-
 "chinas tantopere gloriabatur.

I shall adde, that if *God Almighty* be regulated by the
 rules of *Geometry*, and *mechanical motion* in the manage-
 ment of this *world*, and that the *fabrick* of things is *necessa-*
rily established upon *those Hypotheses*, I cannot any way com-
 prehend how *God* can do any *miracles*: how the *Sun* should
stand still at the command of *Josuah*, or the *shadow* go back
 on the dial of *Abaz*: or how there could be a *general de-*
luge; or such an *Eclipse* as is related at the death of our
Saviour: or that the fire should not *burn*, or destroy the
three children: in *which*, and *other cases*, if *God* were not
 tied up to this *Art*, I do want proof (till he declare it) that
 at *ot/er times* he acts *altogether agreeably to it*. This opi-
 nion

nion of mine hath been hitherto the most *Christian* Assertion, and held most consonant to *Piety*, and hath been amply maintained of late by *Dr. Henry More*, in opposition to what the *Royal Society* lays down in their History; "That Gene-

"ration, Corruption, Alteration, and
 "all the vicissitudes of Nature, are nothing
 "else but the effects arising from the meet-
 "ing of little bodies, of differing figures,
 "magnitudes and velocities. Then which
 opinion there can be nothing more pesti-
 lent and pernicious; and *Dr. More*,
 albeit a Member of this Society here-
 tofore, (for he allows nothing to it
 now) yet a pious one, professeth that
 this *Mechanical Philosophy* doth in-
 cline to *Atheism*: neither would he ap-
 prove of those deductions as necessary,
 but ridiculous, when I upbraided him
 lately with that non-sensical and illiterate
 History, *Mr. Sprat* p. 348. "Tis true,
 "his, [viz. The Experimental Philo-
 "sophers] employment is about materi-
 "al things. But this is so far from
 "drawing him to oppose invisible Beings,
 "that it rather puts his thoughts into an
 "excellent good capacity to believe them.

"In every work of Nature that he handles, he knows that
 "there is not only a gross substance, which presents it self
 "to all mens Eyes; but an infinite subtilty of parts, which
 "come not into the sharpest sense. So that what the Scri-
 "pture relates of the purity of God, of the spirituality of
 "his Nature, and that of Angels, and the souls of men,
 "cannot seem incredible to him, when he perceives the
 "numberless particles that move in every mans Blood, and
 "the prodigious streams that continually flow unseen from every
 "body: having found that his own senses have been so far af-
 "fected by the Instruments of Art, he may sooner admit that
 "his minde ought to be raised higher by an Heavenly light,

Mr. Sprat pag. 311.

I wonder that such effects should be attributed by them to the bare concurrence and meeting of corpuscles of differing figures, magnitudes and velocities; without taking notice of this alteration of texture; and of the figures of the concurrent particles, without which Cartesianism, nor the other Mechanical Philosophies can subsist: and not so without allowing the constant assistance of God, directing and ordering lay-Mechanism. So des Cartes Princ. Philos. part. 2. Deus materiam simul cum motu & quiete in principis creavit; jamque per Solem suum concursus ordinatum tantundem motus & quietis in ea tota, quantum sunt pulsus conservat. Oh! rare and sensible explication of things! God Almighty in a peculiar matter agitates matter! most we thus explain the secondary and medi-are creation of the world in six days, wherein the like productions have not hap-pened in so many thousand years as are lap-sed since! Besides, whatever our First-iso thinks of the Eternal Generation and Incarnation of the Son of God; He doth not except in this Assertion the Genera-tion of mankind in the ordinary and natural way.

in those things wherein his *senses* do fall short. If (as the Apostle says) the invisible things of God are manifested by the visible: then how much stronger Arguments has he for his belief, in the *eternal Power* and *Godhead*, from the vast number of creatures that are invisible to others, but are exposed to his view by the help of his *Experiments*? My *censure* upon this place is, that if his *Experimentator* have any skill in *Logick* or the *ways of arguing*, though from the *Rules of Mechanism*, and the contemplation of *visible bodies*, he may proceed to the allowance of *invisible* and *insensible corpuscles*, yet shall he still confine his progress and ascent within the nature of *matter* and *corpuscles*, and never apprehend (upon those grounds) the *being* and *operations* of an *immaterial, omnipresent Deity* acting by the *Word of his Power and Will*: nor the *incorporeal nature* of the *soul of man*. Such a *Transition ad genus a genere*, or μεταβασις ἐς ἄλλο γένος, he that owns those principles cannot ascent unto, if he understands himself, and argue not so as to alledge,

One Proposition for *sence*,
The other for *convenience*.

Where I speak of *Archytas* (pag. 18.) that he was a *practical and Mechanical Philosopher*, contrary to what Mr. *Glanvill* asserts (pag. 27.) I shall adde his life; As it is briefly written in *Ricciolus* thus. "*Archytas Tarentinus Pythagoreus nobilis, Mathematicarum peritissimus, quem ut una cum Timæo cognosceret Plato, in Italiam navigavit, ut ait Cicero. In Mechanicis excelluit, & vi illarum quin- quies vicit hostes in prælio, ut nihil dicam de columba lignea, quam libramētis ad violatum compulit; sed in Cosmographia at Geometria practica excelluisse indicat illud Horatii lib. 1. odorum.*"

Ricciolus in
Chron. part.
2. præfixo ad
Almag. II. not.
in Archytas.

*Te maris ac terra numeroque carentis arena,
Mensorum cobibent Archyta.*

Neither

Neither is Mr. Glarvill mistaken there in reference to *Archytas* only: what he saith about *Budorus Gnidius* is false: who was a *Mathematicus* also, and amongst other discoveries, "*lavenit etiam Archytas, horologium videlicet se-*" "*lavo, in quo linea horaria, & arcus signorum in modum aranea*" "*se fecant.*" *Blancan.* in *Chronol. Mathemat.* Sevil. 5.

Whereas I say (page 221.) that the *Royal Society* were not the first that applied themselves to the observing the *formes of Animals*, &c. by the *Microscope*: I add that *Zuccbius* did not only precede them in the attempt, but seems to have had better glasses so that purpose then they: for whertas Mr. *Hooke* in his description of a *Flea* says of the *Eyer* only this, that the head is on either side beautified with a quick and round black eye: the more accurate *Zuccbius* saith, "*Novissima a Microscopio parata ab excellentissimo Fa-*" "*torum in omnes formas ad propositos usus formatore D. Eu-*" "*stachio Divinio Septempedano, spoliavit multis oculis senesce-*" "*ritus Oculum pulicis, distinctis in eo albescens Sclerotide*" "*a Cornea, & per corneam Iride oculi.*" And in the description of the feet of a *Fly*, and the feather of a *Peacock*, I observe that there is such a difference betwixt those two *Wri-* *ters*, that as one of them must needs be in an error, so I am apt to think that our *Virtuoso* is the person: see Mr. *Hooke* p. 167, 168, 169, 170. and *Zuccbius* *Philos. opt.* part. 1. tr. 3. c. 7. sect. 4. pag. 349, 350. If *England* do yield better *Microscopis* then those of *Eustachius Divinius*, then I am ready to change my judgement.

Where Mr. *Glarvill* speaks of going to the *World of the Moon*, and I animadvert upon the difficulties of the journey, and that his lodging will be too hot for him; add in the Text these words page 43.

Besides the other difficulties of the journey, 'tis fusther considerable, that from the *Centre* of the *Earth* to the *Moon*, according to the calculation of *Tycho Brahe*, there is near 56 *Semidiameters of the Earth*, which is about 192416 miles: and admit it be supposed that Mr. *Glarvill* flie 20 miles every day in ascending towards that world, he should be above 25 years before he could come to the *Orbe* of the *Moon*.

Z

Where

Blancanus saith of *Archytas*, that he was *Mathematicus* Junior, in *Chronol. mathemat.* scilicet. 5. And *Will. Snellius* in his Preface to the *Hypom.* mathematic. of *S. Stevius*, doth reckon upon *Archytas* and *Eudoxus* as eminent for practical *Mathematics*.

Mr. *Hooke* micrograph. p. 220. *Zuccbius* *philos. opt.* part. 1. cap. 1. sect. 1. p. 39.

Van. Etten *Mathem. recreationum* pag. 220, 221.

Where I speak against the accommodating of *Scripture* to common railing, p. 49. I add, that not only the Council of Trent (— *far est & ab hoste deceri*) hath prohibited *Seff. 4.* that any should apply the holy *Scripture* ad *scurrilia, fabulosa, vana, adulationes*; but also that the first Council at Millain, forbids the using it ad *jocum, ostentationem, contumeliam, superstitionem, impietatem*. And, to upbraid our *Divine-Railleurs* a little more, an ancient *African* Council decrees, *Si Clericus, aut Monachus verba scurrilia, jocularia risumque moventia loquatur, acerrime corripatur*. The words of which Canon, (viz. *Scurrilia & jocularia*) are by a learned Frenchman rendred railing. — “*Nous avons le Canon d'un ancien Concile d'Afrique, qui parle en ces termes: Si quelqu'un du Clerge ou si un Religieux dit des paroles de raillerie, des choses plaisantes & enjouees, qu'il soit chastiee tres severement. Qu'eussent dit a vostre avis ces bons Peres si ces railleries eussent este tenees de l'Escripture?* This Question hath been agitated with much wit and address in French, betwixt Mr. de Girac and Mr. Costar in sundry books, wherein any man of common reason and piety, will give the advantage to adversary of *Veiture*, who is justified by the concurrent opinion of *Balzac* in his remarks *sur les deux sonnets*: and to these Writers I refer our *Virtuosi*, such as reckon upon all other learning as *Pedantry*, may inform themselves thence as out of Writers which transcend not their breeding and studies.

Whereas (pag. 58.) I speak somewhat in commendation of the ancient *Aristotelean* Monks, I find that their esteem is much advanced by the learned *Gabriel Naudaeus* in these words. “*After the last taking of Constantinople, Learning began to creep out of Monasteries, which for all the time before had been (as it were) publike Christian Schools, where not only youth, but also such men as would apply themselves that way, were instructed in all manner of Disciplines, Sciences, and Morality, and that to such an height, that not content with thus so famous Quadrivium of the Mathematicks, which, besides all that is now shewn in Collidges, was then taught, Medicine both as to Theory and Practice, was so well cultivated, that we need no more to convince us how expert they were therein, then the Writings of Aegidius, Constantine,* and

Gabr. Naudaeus
in Hist. of Na-
gick c. 7.

and Damascene, Joannitus, Peter of Spain, and Turis-
 "not. So that it were easie for me to answer those who charge
 them with illiterature and ignorance.

Where I speak out of G. Hofman and others, that it is suf-
 ficient for a *Physician* that he proceed upon such rules and
 methods as may most commodiously guide him in his practice,
 without being solicitous whether they be rigorously and phi-
 losophically true: pag. 75. I add, that there are others as
 eminent as any that ever pretended to cure, which concur
 with me in this opinion. As *Avicenna* and *Rhasinus*; the
 words of the latter in his *Examen of Harvey*, &c. are these.
 " — Quapropter cum Avicenna doct. 6. cap. distinguit sermo-
 "nem utilem a vero; Medicus quia Medicus, inquit ille, non
 "curat, quid in veritate sit, sed contrarius est Phenomenis qui-
 "busdam, quae sunt satis illi in curatione morborum.

I add unto the passages (pag. 97.) which relate unto the
 diligence of the *Ancients* in *Dissection*, this: That the *Anci-
 ents*, and particularly the *Peripateticks* were very curious and
 inquisitive into *Anatomy* appears by this passage out of *Cibal-
 cius*, in his discourse upon the *Timaeus* of *Plato*; he lived
 about one thousand one hundred and seventy years ago, and the
 passage (which relates to the *Platonick* nation about vision)
 in the Latin Edition of *Maurinus*, (pag. 340) runs thus. Qua-
 re faciendum ut ad certam explorationem Platonici dogmatis
 commentum vetus advocetur medicorum, & item Physico-
 rum, illustrium sane virorum, qui, ad comprehendendam sana
 naturae solertiam, actus humani corporis, facta membrorum
 exsectione, rimati sunt: qui existimabant, ita demum se sus-
 picionibus, atque opinionibus certiores futuros, si tam rationi vi-
 sus, quam visui ratio concineret. Demonstranda igitur oculi na-
 tura est: de qua cum plerique alii, tum Alcmaeus Crotoni-
 ensis, in Physicis exercitatus, quique primae exsectionem ag-
 gredi est ausus; & Callisthenes, Aristotelis auditor; & Hero-
 philus, multa, & praetera in lucem protulerunt. Out of which
 it is manifest that the *Ancients* (especially the *Aristotelians*;
 for such were *Callisthenes* and *Herophilus*) did with some curio-
 sity examine the *Phenomena* of nature, and regulated their o-
 pinions by sensible experiments; and that this was the practice
 of most of the eminent *Physicians* and *Naturalists* of old.

The Letter of Hippocrates to Democritus mentioned pag. 89. (though cited as genuine by Galen) is suspected by Jo. Baptista Cartes. miscell. medic. dec. 1. c. 4. "Ceterum & hac Epistola, quæ sub nomine Hippocratis circumfertur, suspecta est mihi, primum quia Diogenes Laertius lib. 9. in vita Democriti scribit illum nequaquam ridentem, quancquam concedat ab Hippocrate fuisse visitatum (non quidem ut ipsum sanaret) quo tempore jam Democritus erat decrepitu, nec amplius aptus sectioni cadaverum: nam Hippocrates 436 annos ante Christum natus; Democritus vero 492 ita ut ita ut Democritum nativitate secutus sit Hippocrates 56 annis: & tum sive ad videndum, sive ad sanandum eum conveniret, vigesimum quintum annum attingisse verisimile videtur: cum tunc temporis Hippocrates medici famam adeptus esset, quod non poterat nisi per longum temporis cursum & varia experimenta in Medicina facta sibi comparare. — Sed probandam proventum Hippocratis ætatem, & majorem senectam Democriti, ejusdem Laertii testimonium extat dicentis; Ultimum, quod in vita Democriti legitur dictum, aut factum, fuisse illam cum Hippocrate colloquutionem: atque quæ annum ægentem 109. ab hujus vita Statione decessisse. I finde also that Menagius suspects these Letters, though he confesses them to be very ancient. Extant hodie Hippocratis de sua ad Democritum professione Epistolæ, sed supposititiæ, licet perantiquæ.

Menag. in Diog. Laert. l. 9. p. 238.

Whereas I say pag. 114. that I have observed in some that their pulses have suffered no alteration, at least kept no time, or palpitated as did their hearts. I shall illustrate this with an observation in a young Lady, which I had too fatal an opportunity lately to make: she died of a very malignant Fever joyned with the Measles: two nights before she died I watched with her, and frequently observing the variety of her pulse, I determined to munde whether there were any such alteration in the beating of the Heart, as I then observed in her Arteries: I laid my hand upon her Breast, and I found that her heart did not beat as usually it doth, the bone erecting it self, and impelling the left side, but it seemed like a great bullet (transcending any proportion that is natural

tural to the Heart) as it rolled in the *Thorax* from the right to the left side (as much one way as the other) with an uniform and equable revolution, and thus it continued to do for an hour; during which time I observed all the varieties almost that are recorded about evil pulses: as quick, slow; great, small; unequal, deficient, dicrotus, &c. Nor is this new; for *Riolanus* saith in *Exam. Harvey* c. 3. *Notavi maleotias in palpitationibus cordis vehementibus arterias non sequi motum Cordis, sed bis terve pulsare Cor pro una diastole Arteriarum: quod indicat Arterias in sanis & agris corporibus, non semper sequi motus cordis.* So doth *Mercatus* teach, *Fis interdum palpitatio cordis nihil mutatis pulsibus.* Tom. 1. de *Philos. differ.* l. 2. tr. 1. c. 28. & tom. 3. l. 2. c. 5j.

Since the writing hereof, being casually in the shop where an old man was blooded, who upon the healing up of an old sore in his leg, was very ill: I observed his blood to have very little of what was crassus in it: but it seemed all a fluid Serum to the bottom, (which was pellucid, not of a turbid white,) in some *Pottingers*: in one *Pottinger* that ran last, it was coagulated into a thicker mass, on the top whereof was coagulated a translucent gelatin over most of the *Pottinger*, the rest being of a fluid Serum like to the other: I took some spirit of *Vitriol*, and poured a pretty quantity, (viz. about 20 drops) on that which was partly coagulated upwards, partly not: and all that part which was not blood, did coagulate into a mass like unto the white of an Egg when hardened by the fire, but without that flabb which is usual to it when coagulated upon a gentle fire: the blood under it coagulated into a coagulance much like was: but of a dark red inclining to black: into another *Pottinger* I poured some of the salt-peter-liquor that had passed the *Altes*; but this latter caused no change at all: I then poured on the same some spirit of *Vitriol*, as in the other, and it did immediately turn lacteous, and coagulated into a mass like to that of ordinary custards: and the blood under, which seemed but very little, and scarce coagulated, appeared thereupon as a large quantity, equalling three parts of the *Pottinger*, upon which all the Serum was thus coagulated. I went to burn these: that

that blood which had only spirit of Vitriol did not crackle, and scarce burn: though a little it did: the pure coagulated Serum did not burn at all, yet crackled like decrepitating Salt, a little: that with the spirit of Vitriol and Lixivium of Nitre, did burn with a vivid and lasting flame a long time.

I think my self obliged to adde one thing more where I speak as if Dr. Willis had had little to do in the discoveries of Dr. Lower about Anatomy: that although that great Physician had not leisure to attend the Anatomical Inquiries, yet did he propose new matter for improving the discoveries, and put Dr. Lower upon continual investigation, thereby to see if Nature and his Suppositions did accord: and although that many things did occur beyond his apprehension, yet was the grand occasion of that work, and in much the Author. This Intelligence doth not cross what I related before from good testimony; yet I thought my self obliged to declare the whole truth, and such I believe this to be. I must also profess that I think the Sinus venarum vertebrales, whose invention I ascribe to Dr. Lower, may without considerable injury be ascribed unto Fallopius in his Anatomical Observations pag. 193. edit. Colonienf. 1562. in 8°. Thus much I thought fitting to annex, lest the Viriassi should censure me as partial to my old School-fellow Dr. Lower, or swayed by any regard then that of Truth.

The Hogs-blood which I last mentioned as poured upon the Mothers of Salt-peter; after it had stood above three weeks unmixed, did at last cast down about half of it self below the Mothers, it continuing in that place it turned crimson: that on the top did not change its colour, but on the surface there gathered a crust or mass, not very thick (as before) nor of so solid a consistence.

F I N I S.

To divert my Reader after so tedious a discourse, I shall here add the Letter of *Coga* their Patient, that they may see how efficacious the Transfusion hath been on him, and what returns he makes for his Cure.

To the Royal Society the *VIRTUOSI*, and all the
Honourable Members of it, the Humble Address of
AGNUS COGA.

Your Creature (for he was his own man till your Experiment transform'd him into another species) amongst those many alterations he finds in his condition, which he thinks himself oblig'd to represent them, finds a decay in his purse as well as his body, and to recruit his spirits is forc'd to forfeit his nerves, for so is money as well in peace as warre. 'Tis very miserable, that the want of natural heat should rob him of his artificial too: But such is his case; to repair his own ruines, (yours, because made by you) he pawns his cloaths, and dearly purchases your sheeps blood with the loss of his own wooll. In this sheep-wrack't vessel of his, like that of *Arges*, he addresses himself to you for the Golden Fleece. For he thinks it requisite to your Honours, as perfect Metaplasts, to transform him without as well as within. If you oblige him in this, he hath more blood still at your service, provided it may be his own, that it may be the nobler sacrifice.

The meaneſt of your Flock,
AGNUS COGA.

ERRATA

Page 2 Line 31 blot out after Euclid p. 31. 13 read veriffimum p. 46 35 r. equalifque p. 9 blot out the
Marginal note p. 9 l. 14 r. Eratosthenes lib. l. 14 r. diacretastofon fol. 34 r. Methinks I already live in those
times when the Virrue are as afured as they Remains Book p. 12 l. 12 Verfpical p. 14 l. 12 r. Orde p. 18
21 r. Bagdad Fey and Cardova p. 171-15 r. Indemittable ibid. l. 31 r. Vigoruz p. 121. 34 r. Savanorela p.
21 penult. be very defective p. 23 l. 3 r. Anian p. 28 in the Margin r. Sparrice cavum ib. l. 29 r. mae p. 29
39 r. and thereupon fpe in the Marg citation out of Buchbin l. 9 r. vitalliter p. 30 l. 26 r. prius p. 31 l. 2 r.
Sarfius p. 32 l. 22 r. conftruimus l. penult. alide p. 33 l. 8 r. album ibid. l. 17 r. apparentiam ibid. l. 7 r. vir-
riturum ibid. l. 91 after Telestus addc affur ibid. l. ult. r. elich p. 34 l. 1 r. in p. 30 l. 5 r. Focantury ib. Marg.
r. peffum igne p. 40 l. 35 r. thorough three p. 42 l. 20 r. In p. 47 l. 33 r. rubi Margin after Difci blot out the
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6 l. 120 for fecal Guidance ib. l. 25 r. effoffment p. 133 l. 15 after a alide Man p. 154 l. 7 blot out ip. p. 155 l. 9 r.
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nentibus ib. l. 15 r. vulgaritate p. 171 l. 1 r. Maribus ib. l. 10 r. granib. p. 174 l. 35 r. valatum l. 31 for at r. ei p. 174
2 r. vaillity ib. l. 4 r. curribus ib. l. 1 before Council add Provincial p. 175 l. 27 r. Aras p. 178 l. 2 r. Dama-
terus ib. l. 2 r. Correr ib. l. 26 r. case p. 179 l. 13 for Philes r. Puls p. 178 l. ult. r. confistence.

There are most of the material *Errata* which I have had leisure to take notice of: there are several of the *Marginal Notes* and *Citations* which are not placed opposite to the places they refer unto; an understanding Reader and Adversary will easily judge thereof: and if any man take any advantages from any probable *Errata* or such like failures as my haste or the *Licensers* dash may have committed, (though not taken notice of here neither have I crept into all the *Sheets*) I know not how to help my self; this *Premonition* avail me not.